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USSR and the United States: Price Ratios for Machinery, 1967 Rubles - 1972 Dollars Volume II

A Research Paper

ER 80-10410
September 1980

Approved For Release 2008/09/16 : CIA-RDP08S01350R000100190001-6

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Research for this report was completed in April 1980.

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Preface

This volume contains appendixes F and G of the Soviet-US price comparison study, "Price Ratios for Machinery."

Appendix F presents the technical specifications for all the Soviet and US items in the sample. Only those specifications that are important to the matches—that is, the ones that affect performance and function appreciably—are included in the comparison. One exception is weight, which has been included, where available, because of its general interest.

In many cases specifications for an individual model of equipment had to be taken from non-*Tsenniki* sources because of the incompleteness of the data in the *Tsenniki*. In these cases, weights given in the non-*Tsenniki* sources also were used. It is not uncommon for different Soviet sources to show different weights for the same item. Thus the weights listed in this appendix may differ from those in the *Tsenniki*.

The *Tsennik* source of the ruble price is given on the top line for each item. The coding for each item is described below, using Item 1 as an example: the first number—(26)—indicates the number of the *Tsennik*, the second number—(72)—indicates the *Tsennik* series, in this case, 1 January 1972, and the third number—(147)—indicates the position number of the item in the *Tsennik*.

Throughout this appendix a dash has been used to indicate that information is not applicable; NA has been used to indicate that information is not available.

Appendix G lists the *Tsenniki* used in this study, in numerical order. The sample item numbers covered by each *Tsennik* are also included. *Tsenniki* in the 1 January 1972 series are listed first, followed by those in the 1 January 1973 series. Appendix G also lists all the other sources of price data used in the study

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Appendix F. Soviet and US Technical Specifications

Appendix G. List of Sources for Ruble Prices

Appendix F

Energy and Power Machinery and Equipment

Item Number 1	*Tsennik:*	26 (72); 147
Steam boiler (drum-type)	**Rubles:**	668,430
	Dollars:	4,470,000
	Ruble-Dollar Ratio:	.15

Soviet Model: BKZ-160-100FB

Specifications	USSR	US	Difference (US as percent of USSR)
Fuel	Pulverized Hard Coal		—
Output (tons/hr)	160		100
Design pressure (atm)	100		100
Steam temperature (°C)	540		100

Function
Steam boilers produce steam to operate a turbine-generator to generate electric power.

Comparability
In the United States, steam boilers for the generation of electric power are made to user specifications. Hence, the US analog is a custom-made unit that has been matched to Soviet specifications.

Representativeness
This item is more representative of Soviet production. In 1972, US boilers of this size were gas or oil fired. Typically, boilers of this size would be used by utilities in the United States for peaking purposes.

Energy and Power Machinery and Equipment

Item Number 2	*Tsennik:*	26 (72); 136
Steam boiler (drum-type)	**Rubles:**	1,286,300
	Dollars:	8,046,000
	Ruble-Dollar Ratio:	.16

Soviet Model: E-320-140-B

Specifications	USSR	US	Difference (US as percent of USSR)
Fuel	Brown coal		—
Output (tons/hr)	320		100
Design pressure (atm)	140		100
Steam temperature (°C)	570		100

Function
Steam boilers produce steam to operate a turbine-generator to generate electric power.

Comparability
In the United States, steam boilers for the generation of electric power are made to user specifications. Hence, the US analog is a custom-made unit that has been matched to the Soviet specifications.

Representativeness
This item is more representative of Soviet production. Only a few boilers have been designed in the United States to operate on brown coal (lignite), and all have been substantially larger than the model in this item. Also, in US practice, most boilers have been designed to operate with steam temperatures of 540°C or less; efficiency is reduced somewhat but is more than compensated for by increased reliability and lower costs.

Energy and Power Machinery and Equipment

Item Number 3	*Tsennik:*	26 (72); 133
Steam boiler (drum-type)	**Rubles:**	1,610,860
	Dollars:	10,436,000
	Ruble-Dollar Ratio:	.15

Soviet Model: E-420-140

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Fuel	Pulverized hard coal		—
Output (tons/hr)	420		100
Design pressure (atm)	140		100
Steam temperature (°C)	570		100

Function
Steam boilers produce steam to operate a turbine-generator to generate electric power.

Comparability
In the United States, steam boilers for the generation of electric power are made to user specifications. Hence, the US analog is a custom-made unit that has been matched to the Soviet specifications.

Representativeness
This item is more representative of Soviet production. In the United States, most boilers have been designed to operate at lower temperatures—540°C or less; efficiency is reduced somewhat but is more than compensated for by increased reliability and lower costs.

Energy and Power Machinery and Equipment

Item Number 4	*Tsennik:*	26 (72); 128
Steam boiler (drum-type)	**Rubles:**	3,055,410
	Dollars:	15,423,000
	Ruble-Dollar Ratio:	.20

Soviet Model: EP-640-140

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Fuel	Pulverized hard coal		—
Output (tons/hr)	640		100
Design pressure (atm)	140		100
Steam temperature (°C)	570		100

Function
Steam boilers produce steam to operate a turbine-generator to generate electric power.

Comparability
In the United States, steam boilers for the generation of electric power are made to user specifications. Hence, the US analog is a custom-made unit that has been matched to the Soviet specifications.

Representativeness
This item is more representative of Soviet production. In the United States, most boilers have been designed to operate at lower temperatures—540°C or less; efficiency is reduced somewhat but is more than compensated for by increased reliability and lower costs.

Energy and Power Machinery and Equipment

Item Number 5	*Tsennik:*	26 (72);*
Turbine-generator	**Rubles:**	13.61/kW
	Dollars:	42.61/kW
	Ruble-Dollar Ratio:	.32

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (MW)			
Turbine	115	115	100
Generator	115	115	100
Steam pressure (atm)	130	122	94
Steam temperature (°C)	565	540	96

Function
Turbine-generators, powered by steam from a boiler, are used by electric utilities to generate electricity.

Comparability
The Soviet item is a hypothetical unit that has been matched to the capacity of the US unit. It was derived from data on Soviet turbine-generators of different capacities but with approximately the same steam pressure and temperature. The US model has slightly lower efficiency, because of the use of lower temperatures and pressures, but better reliability. Also, the US model is relatively more economical because less costly materials are required in high temperature zones of the turbine.

Representativeness
This item is representative of production in both countries.

* The Soviet item has been matched to the capacity of the US item. The price of the Soviet item was obtained by regression using *Tsennik* 26 data. This is the only case in the sample of a "hypothetical" Soviet item matched to a US analog. This approach was dictated by data constraints. Similarly, there are two cases in the sample of "hypothetical" US units matched to Soviet items—Item 8 (page 8) and Item 9 (page 9).

Energy and Power Machinery and Equipment

Item Number 6	***Tsennik:***	26 (72); 10
Turbine-generator	**Rubles:**	12.97/kW
	Dollars:	30.67/kW
	Ruble-Dollar Ratio:	.42

Soviet Model: K-160-130/TV-2-150-2

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (MW)			
Turbine	160	172	108
Generator	150	150	100
Steam pressure (atm)	130	122	94
Steam temperature (°C)	565	540	96

Function
Turbine-generators, powered by steam from a boiler, are used by electric utilities to generate electricity.

Comparability
The US unit has a slightly larger turbine which makes it possible to hook up additional generator capacity should the need arise. The US model has slightly lower efficiency, because of the use of lower pressures and temperatures, but better reliability. Also, the US model is relatively more economical because less costly materials are required in high temperature zones of the turbine.

Representativeness
This item probably is representative of production in both countries.

Energy and Power Machinery and Equipment

Item Number 7	***Tsennik:***	26 (72); 9
Turbine-generator	**Rubles:**	12.29/kW
	Dollars:	20.06/kW
	Ruble-Dollar Ratio:	.61

Soviet Model: K-160-130/PVK-150+TVV-165-2

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (MW)			
Turbine	160	160	100
Generator	160	160	100
Steam pressure (atm)	130	122	94
Steam temperature (°C)	565	540	96

Function
Turbine-generators, powered by steam from a boiler, are used by electric utilities to generate electricity.

Comparability
The use of lower operating temperatures and pressures on the US model reduces efficiency somewhat, relative to the Soviet model, but provides better reliability. Also, the US model is more economical because less costly materials are required in the high temperature zones of the turbine.

Representativeness
This item probably is representative of production in both countries.

Energy and Power Machinery and Equipment

Item Number 8	*Tsennik:*	26 (72); 7
Turbine-generator	**Rubles:**	11.59/kW
	Dollars:	19.74/kW
	Ruble-Dollar Ratio:	.59

Soviet Model: K-200-130 TVV-200-2

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (MW)			
Turbine	200	200 [1]	100
Generator	200	200 [1]	100
Steam pressure (atm)	130	122	94
Steam temperature (°C)	565	540	96

[1] Approximate.

Function
Turbine-generators, powered by steam from a boiler, are used by electric utilities to generate electricity.

Comparability
The US unit is a hypothetical unit derived by averaging two installations of 265 and 160 MW capacities. The use of lower operating temperatures and pressures on the US model reduces efficiency somewhat, relative to the Soviet model, but provides better reliability. Also, the US model is more economical because less costly materials are required in the high temperature zones of the turbine.

Representativeness
This item probably is representative of production in both countries.

Energy and Power Machinery and Equipment

Item Number 9	***Tsennik:***	26 (72); 1
Turbine-generator	**Rubles:**	15.64/kW
	Dollars:	29.67/kW
	Ruble-Dollar Ratio:	.53

Soviet Model: K-300-240 (LMZ)

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (MW)			
Turbine	300	300	100
Generator	300	300	100
Steam pressure (atm)	240	240	100
Steam temperature (°C)	560	538	96

Function
Turbine-generators, powered by steam from a boiler, are used by electric utilities to generate electricity.

Comparability
The US item is a hypothetical unit that has been matched to the Soviet specifications for capacity and pressure. The temperature of the US unit is somewhat lower because US designers prefer the economies from the use of cheaper materials in the high temperature zones of the turbines to the somewhat higher efficiency provided by higher temperatures.

Representativeness
This item is representative of production in both countries.

Energy and Power Machinery and Equipment

Item Number 10	*Tsennik:*	25 (72); 92
Diesel-generator	**Rubles:**	1,030
	Dollars:	2,123
	Ruble-Dollar Ratio:	.49

Soviet Model: 4Ch10.5/13(D-40A)

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	4-cylinder, water cooled	4-cylinder, water cooled	—
Rated horsepower x 1,500 rpm	40	39.5	99
Specific fuel consumption (g/hp/hr)	215	182	85
Weight (kg)	750	315	42
Weight-to-horsepower ratio (kg:hp) [1]	18.8:1	8:1	43

[1] The lower the numerical value of the specification, the better the design of the engine.

Function
These are general-purpose diesel engines used in a variety of industrial applications.

Comparability
The US and Soviet engines are similar in function and power. The US model would be more economical to operate over time and is judged to be of better quality. The lighter weight of the US engine reflects the fact that it was designed for mobile applications—in which a good weight-to-horsepower ratio is emphasized—and has been adapted for stationary operation, the normal custom in the United States.

Representativeness
This item probably is more representative of Soviet production. Engines of this type and size are common in the United States but more often as a standby engine than as the prime unit as is the case in the USSR.

Energy and Power Machinery and Equipment

Item Number 11	*Tsennik:*	25 (72); 117
Diesel engine	**Rubles:**	3,590
	Dollars:	3,747
	Ruble-Dollar Ratio:	.96

Soviet Model: 6Ch15/18 (U1D6-S2)

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	6-cylinder, water cooled	6-cylinder, water cooled	—
Rated horsepower x 1,500 rpm	165	160 [1]	97
Specific fuel consumption (g/hp/hr)	176	166	94
Weight (kg)	1,670	1,475	88
Weight-to-horsepower ratio (kg:hp) [2]	10.1:1	9.2:1	91

[1] At 1,460 rpm.
[2] The lower the numerical value of the specification, the better the design of the engine.

Function
These are medium-duty general-purpose diesel engines used in a variety of industrial applications.

Comparability
The US and Soviet engines are comparable in power. The US analog would be more economical to operate over time and is judged to be of better quality.

Representativeness
This item is representative of production in both countries.

Energy and Power Machinery and Equipment

Item Number 12	*Tsennik:*	25 (72); 143
Diesel engine	**Rubles:**	38,620
	Dollars:	56,480
	Ruble-Dollar Ratio:	.68

Soviet Model: 6ChN36/45 (G-66)

Specifications:	USSR	US	Difference (US as percent of USSR)
Type	6-cylinder, turbocharged	8-cylinder, turbocharged	—
Rated horsepower [1]	900	945	105
Specific fuel consumption (g/hp/hr)	160	178	111
Weight (kg)	26,700	10,000	37
Weight-to-horsepower ratio (kg:hp) [2]	29.7:1	10.6:1	36

[1] At 375 rpm for the Soviet model; at 900 rpm for the US model.
[2] The lower the numerical value of the specification, the better the design of the engine.

Function
These are large, heavy-duty diesel engines used in such applications as running power generators where the requirement is for long-range steady use.

Comparability
The US and Soviet engines are comparable in power. The Soviet engine is a little more economical in fuel consumption because it operates at a slow speed. On the other hand, the US analog weighs only about one-third as much, a reflection of the stress in the United States on a low weight-to-horsepower ratio in order to reduce material costs for a given power requirement.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 13	***Tsennik:***	1 (72); 1
Electric motor, AC	**Rubles:**	19
	Dollars:	54
	Ruble-Dollar Ratio:	.35

Soviet Model: AOL2-11-2

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (kW)	0.8	0.75	94
Speed (rpm) [1]	3,000	3,450	115
Frequency (Hz) [1]	50	60	—
Voltage (V)	380, 500 or 220/380	208 or 220/440	—
Number of phases	3	3	—
Totally enclosed fan cooled	Yes	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function

These are general-purpose electric motors used in a variety of industrial applications.

Comparability

The Soviet model is slightly more powerful, but the difference is not significant.

Representativeness

This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 14	*Tsennik:*	1 (72); 722
Electric motor, AC	**Rubles:**	24
	Dollars:	104
	Ruble-Dollar Ratio:	.23

Soviet Model: AOL2-22-4Sh

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (kW)	1.1	1.12	102
Speed (rpm)[1]	1,500	1,800	120
Frequency (Hz)[1]	50	60	—
Voltage (V)	127/200 or 220/380	230/460	—
Number of phases	3	3	—
Totally enclosed fan cooled	Yes	Yes	—
Quiet	Yes	No	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are special-purpose electric motors used in a variety of industrial applications.

Comparability
The US model is slightly more powerful, but the difference is not significant. The Soviet motor, being a quiet model, may have certain applications that the US model does not have.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 15	***Tsennik:***	1 (72); 401
Electric motor, AC	**Rubles:**	68
	Dollars:	211
	Ruble-Dollar Ratio:	.32

Soviet Model: T52-6

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (kW)	4.5	3.7	82
Speed (rpm) [1]	1,000	1,200	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	220/380	230/460 or 460	—
Number of phases	3	3	—
Squirrel cage rotor	Yes	Yes	—
Drip-proof	NA	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are special-purpose electric motors used to operate machine tools and various other mechanisms.

Comparability
The Soviet model is slightly more powerful, but the difference is not significant.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 16	*Tsennik:*	1 (72); 751
Electric motor, AC	**Rubles:**	127
	Dollars:	396
	Ruble-Dollar Ratio:	.32

Soviet Model: VAO-51-2

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (kW)	10	11.2	112
Speed (rpm) [1]	3,000	3,600	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	220 or 380 500 or 660	220 or 230 460 or 575	—
Number of phases	3	3	—
Explosion proof	Yes	Yes	—
Squirrel cage rotor	Yes	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are special-purpose electric motors for use in mines and other installations where explosive mine gas (methane), coal dust, or other steam-gas-air mixtures are a danger.

Comparability
The US model is slightly more powerful, but the difference is not significant.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 17	*Tsennik:*	1 (72); 40
Electric motor, AC	**Rubles:**	264
	Dollars:	647
	Ruble-Dollar Ratio:	.41

Soviet Model: AO2-81-4

Specifications	USSR	US	Difference (US as percent of USSR)
Capacity (kW)	40	37.3	93
Speed (rpm) [1]	1,500	1,800	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	220/380,	230/460	—
	380 or 500	or 460	
Number of phases	3	3	—
Squirrel cage rotor	Yes	Yes	—
Totally enclosed fan cooled	Yes	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are general-purpose electric motors used in a variety of industrial applications.

Comparability
The Soviet model is slightly more powerful, but the difference is not significant.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 18	*Tsennik:*	1 (72); 881
Electric motor, AC	**Rubles:**	1,660
	Dollars:	2,963
	Ruble-Dollar Ratio:	.56

Soviet Model: MA-36-2

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (kW)	75	75	100
Speed (rpm) [1]	1,000	1,200	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	380, 500, or 600	200, 230, 460 or 575	—
Number of phases	3	3	—
Totally enclosed fan cooled	Yes	Yes	—
Explosion proof	Yes	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are special-purpose electric motors for use in mines and other installations where explosive mine gas (methane), coal dust, or other steam-gas-air mixtures are a danger.

Comparability
The motors are of the same power.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 19	*Tsennik:*	1 (72); 132
Electric motor, AC	**Rubles:**	603
	Dollars:	2,807
	Ruble-Dollar Ratio:	.21

Soviet Model: AO-94-2

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (kW)	100	93	93
Speed (rpm) [1]	3,000	3,600	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	220, 380 or 500	230/460 or 460	—
Number of phases	3	3	—
Totally enclosed fan cooled	Yes	Yes	—
Squirrel cage rotor	Yes	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are special-purpose electric motors used in a variety of industrial applications.

Comparability
The Soviet model is slightly more powerful, but the difference is not significant.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 20	*Tsennik:*	1 (72); 1274
Electric motor, AC	**Rubles:**	2,400
	Dollars:	5,267
	Ruble-Dollar Ratio:	.46

Soviet Model: DSK-13-24-12

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (kW)	200	186	93
Speed (rpm) [1]	500	600	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	380	460	—
Number of phases	3	3	—
Synchronous	Yes	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are electric motors designed for use with heavy-duty compressors and blowers.

Comparability
The Soviet model is slightly more powerful, but the difference is not significant.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 21	*Tsennik:*	1 (72); 2267
Electric motor, AC	**Rubles:**	6,280
	Dollars:	34,002
	Ruble-Dollar Ratio:	.18

Soviet Model: P-143-6K

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (kW)	250	224	90
Speed (rpm)	500/1,500	500/1,500	100/100
Voltage (V)	440	500	—
Forced ventilation	Yes	Yes	—
Compensated for speed variation	Yes	Yes	—
Totally enclosed fan cooled	Yes	Yes	—

Function

These are compensated (balanced), heavy-duty electric motors used for driving auxiliary mechanisms in rolling mills, excavators, and other machines requiring a wide regulation of speed of rotation and having a short-term overload capacity.

Comparability

The Soviet model is slightly more powerful, but the difference is not significant.

Representativeness

This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 22	*Tsennik:*	1 (72); 1649
Electric motor, AC	**Rubles:**	6,620
	Dollars:	10,663
	Ruble-Dollar Ratio:	.62

Soviet Model: AN-14-49-6

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (kW)	1,000	932	93
Speed (rpm) [1]	1,000	1,200	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	3,600 or 6,000	2,300	—
Number of phases	3	3	—
Squirrel cage rotor	Yes	Yes	—
Drip-proof	NA	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are general-purpose electric motors used in a variety of industrial applications, but especially with heavy-duty pumps and blowers.

Comparability
The Soviet model is slightly more powerful, but the difference is not significant.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 23	*Tsennik:*	1 (72); 2039
Electric motor, AC	**Rubles:**	26,820
	Dollars:	99,724
	Ruble-Dollar Ratio:	.27

Soviet Model: SDN-18-74-20

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (kW)	4,000	4,475	112
Speed (rpm) [1]	300	360	120
Frequency (Hz) [1]	50	60	—
Voltage (V)	6,000	4,000	—
Synchronous	Yes	Yes	—
Totally enclosed fan cooled	Yes	Yes	—

[1] Motors are comparable for these parameters if the ratios of speed to frequency are approximately the same.

Function
These are electric motors designed primarily for use with heavy-duty pumps and blowers.

Comparability
The US model is slightly more powerful, but the difference is not significant.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 24	***Tsennik:***	28 (72); 20
Hydrogenerator	**Rubles:**	1,081,860
	Dollars:	2,579,000
	Ruble-Dollar Ratio:	.42

Soviet Model: 80,000 KVA

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Synchronous 3-phase vertical shaft		—
Capacity (kva)	80,000		100
Speed (rpm)	83.3		100
Output voltage (kV)	15		100

Function
Hydrogenerators are driven by a water turbine to produce electric power.

Comparability
The US hydrogenerator has been matched to the Soviet specifications. In the United States, hydrogenerators are custom made to user specifications.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 25	***Tsennik:***	28 (72); 21
Hydrogenerator	**Rubles:**	1,218,000
	Dollars:	3,201,000
	Ruble-Dollar Ratio:	.38

Soviet Model: 100,000 KVA

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Synchronous 3-phase vertical shaft		—
Capacity (kva)	100,000		100
Speed (rpm)	88.2		100
Output voltage (kV)	15		100

Function
Hydrogenerators are driven by a water turbine to produce electric power.

Comparability
The US hydrogenerator has been matched to the Soviet specifications. In the United States, hydrogenerators are custom made to user specifications.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 26	*Tsennik:*	28 (72); 23
Hydrogenerator	**Rubles:**	1,916,160
	Dollars:	4,075,000
	Ruble-Dollar Ratio:	.47

Soviet Model: 150,000 KVA

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Synchronous 3-phase vertical shaft		—
Capacity (kva)	150,000		100
Speed (rpm)	83.3		100
Output voltage (kV)	15		100

Function
Hydrogenerators are driven by a water turbine to produce electric power.

Comparability
The US hydrogenerator has been matched to the Soviet specifications. In the United States, hydrogenerators are custom made to user specifications.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 27	***Tsennik:***	28 (72); 24
Hydrogenerator	**Rubles:**	2,085,120
	Dollars:	4,472,000
	Ruble-Dollar Ratio:	.47

Soviet Model: 275,000 KVA

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Synchronous 3-phase vertical shaft		—
Capacity (kva)	275,000		100
Speed (rpm)	125		100
Output voltage (kV)	15		100

Function
Hydrogenerators are driven by a water turbine to produce electric power.

Comparability
The US hydrogenerator has been matched to the Soviet specifications. In the United States, hydrogenerators are custom made to user specifications.

Representativeness
This item is more representative of Soviet production.

Electrotechnical Machinery and Equipment

Item Number 28	*Tsennik:*	25 (72); 342
Engine-generator set (gas)	**Rubles:**	56,360
	Dollars:	319,637
	Ruble-Dollar Ratio:	.18

Soviet Model: 11GD100

Specifications:	USSR	US	Difference (US as percent of USSR)
Generator output power (kW)	1,000	1,000	100
Frequency (Hz)	50	60	—
Rated power of engine			
hp	1,500	1,700	113
rpm	750	720	96
Fuel	Natural gas	Natural gas	—
Gas consumption (m^3/kW-hr)	.38	.29	76
Weight (kg)	23,813	22,032	93

Function
This type of engine-generator set uses a generator powered by an engine operating on gaseous fuel to generate electric power.

Comparability
The Soviet model is a copy of an earlier design of the US analog. The US analog reflects the improvements of subsequent design. The analog generates the same output power with a slightly more powerful engine turning at a slower speed and is significantly more efficient with a gas consumption rate only about three-fourths that of the Soviet model.

Representativeness
This item is more representative of Soviet production. The USSR has a far greater need for these small power stations for remote areas than does the United States.

Electrotechnical Machinery and Equipment

Item Number 29	*Tsennik:*	25 (72); 297
Engine-generator set (diesel)	**Rubles:**	3,430
	Dollars:	5,445
	Ruble-Dollar Ratio:	.63

Soviet Model: 4DM12

Specifications:	USSR	US	Difference (US as percent of USSR)
Generator output power (kW)	24	30	125
Frequency (Hz)	50	60	—
Rated power of engine			
hp	40	63	158
rpm	1,500	1,800	120
Gas consumption (kg/kW-hr)	.27	.22	81
Weight (kg)	1,390	588	42

Function
This type of engine-generator set uses a generator powered by a diesel engine to generate electric power.

Comparability
The US analog is more powerful, generates 25 percent more electric power, and has a much lower rate of fuel consumption.

Representativeness
This item is representative of production in both countries.

Electrotechnical Machinery and Equipment

Item Number 30	***Tsennik:***	29 (72); 287
Power transformer	**Rubles:**	3,620
	Dollars:	5,375
	Ruble-Dollar Ratio:	.67

Soviet Model: TM-1000/10

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Oil-filled 3-phase substation		—
Capacity (kVA)	1,000	1,000	100
Voltage (kV)	10/0.40 [1]	12/0.48 [1]	120/120
Frequency (Hz)	50	60	—
Weight, total (tons)	4.7	NA	—
Of which, oil (tons)	1.5	NA	—

[1] Input voltage/output voltage.

Function

These transformers are used at electric power substations to step down transmission line voltages to a lower rating for local distribution.

Comparability

The US and Soviet models are matched in capacity, the most important performance characteristic. A comparison of efficiency is not possible because current input is not known. In general, Soviet transformers usually have higher losses—in current and magnetism (hysteresis)—and require a larger energy input for a given energy output compared with US transformers.

Representativeness

This item is representative of production in both countries. The US model is somewhat customized to user specifications. The Soviet model is highly standardized.

Electrotechnical Machinery and Equipment

Item Number 31	***Tsennik:***	29 (72); 294
Power transformer	**Rubles:**	7,180
	Dollars:	11,001
	Ruble-Dollar Ratio:	.65

Soviet Model: TM-2500/35

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Oil-filled 3-phase substation		—
Capacity (kVA)	2,500	2,500	100
Voltage (kV)	35/10 [1]	34.4/12 [1]	98/120
Frequency (Hz)	50	60	—
Weight, total (tons)	17	8.3	49
Of which, oil (tons)	4.8	NA	—

[1] Input voltage/output voltage.

Function

These transformers are used at electric power substations to step down transmission line voltages to a lower rating for local distribution.

Comparability

The US and Soviet models are matched in capacity, the most important performance characteristic. A comparison of efficiency is not possible because current input is not known. In general, Soviet transformers usually have higher losses—in current and magnetism (hysteresis)—and require a larger energy input for a given energy output compared with US transformers.

Representativeness

This item is representative of production in both countries. The US model is somewhat customized to user specifications. The Soviet model is highly standardized.

Electrotechnical Machinery and Equipment

Item Number 32	*Tsennik:*	29 (72); 297
Power transformer	**Rubles:**	18,230
	Dollars:	24,283
	Ruble-Dollar Ratio:	.75

Soviet Model: TD-10000/35

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Oil-filled 3-phase substation		—
Capacity (kVA)	10,000	10,000	100
Voltage (kV)	35/10 [1]	34.4/12 [1]	98/120
Frequency (Hz)	50	60	—
Weight, total (tons)	21.2	NA	—
Of which, oil (tons)	5.2	NA	—

[1] Input voltage/output voltage.

Function

These transformers are used at electric power substations to step down transmission line voltages to a lower rating for local distribution.

Comparability

The US and Soviet models are matched in capacity, the most important performance characteristic. A comparison of efficiency is not possible because current input is not known. In general, Soviet transformers usually have higher losses—in current and magnetism (hysteresis)—and require a larger energy input for a given energy output compared with US transformers.

Representativeness

This item is representative of production in both countries. The US model is somewhat customized to user specifications. The Soviet model is highly standardized.

Electrotechnical Machinery and Equipment

Item Number 33	*Tsennik:*	3 (72); 48
Oil switch	**Rubles:**	603
	Dollars:	3,456
	Ruble-Dollar Ratio:	.17

Soviet Model: VMP-10-600/350

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated voltage (kV)	10	14.4	144
Rated current (amperes)	600	600	100
Cutoff capacity (MVA)	350	300 [1]	86

[1] Calculated. The corresponding US specification, "Nominal 3-Phase MVA," is given as 250. However, the Soviet and US rating systems are different. The US specification is based on "asymmetrical interrupting current"; the Soviet specification on "symmetrical interrupting current." The US value was multiplied by 1.2 to convert the 250 MVA to the Soviet rating base.

Function

These oil switches are oil-filled circuit breakers used for medium-duty applications in electrical distribution systems.

Comparability

The differences in voltage and cutoff capacity are not significant.

Representativeness

This item is representative of production in both countries. The Soviet model is a standardized item that probably is serially produced. The US analog is batch produced and generally is custom tailored to specific requirements.

Electrotechnical Machinery and Equipment

Item Number 34	*Tsennik:*	3 (72); 61
Oil switch	**Rubles:**	1,440
	Dollars:	4,995
	Ruble-Dollar Ratio:	.29

Soviet Model: VMP-35P

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated voltage (kV)	35	25.8	74
Rated current (amperes)	1,000	1,200	120
Cutoff capacity (MVA)	500	600 [1]	120

[1] Calculated. The corresponding US specification, "Nominal 3-Phase MVA," is given as 500. However, the Soviet and US rating systems are different. The US specification is based on "asymmetrical interrupting current"; the Soviet specification on "symmetrical interrupting current." The US value was multiplied by 1.2 to convert the 500 MVA to the Soviet rating base.

Function

These oil switches are oil-filled circuit breakers used for medium-duty applications in electrical distribution systems.

Comparability

The US analog has larger contacts to handle a slightly larger flow of current, but its voltage is lower which means the contacts need not open as wide as on the Soviet model. These differences are design trade-offs.

Representativeness

This item is representative of production in both countries. The Soviet model is a standardized item that probably is serially produced. The US analog is batch produced and generally is custom tailored to specific requirements.

Electrotechnical Machinery and Equipment

Item Number 35	*Tsennik:*	3 (72); 36
Oil switch	**Rubles:**	3,055
	Dollars:	6,987
	Ruble-Dollar Ratio:	.44

Soviet Model: MKP-35-1500

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated voltage (kV)	35	38	109
Rated current (amperes)	1,000	1,200	120
Cutoff capacity (MVA)	1,500	1,800 [1]	120

[1] Calculated. The corresponding US specification, "Nominal 3-Phase MVA," is given as 1,500. However, the Soviet and US rating systems are different. The US specification is based on "asymmetrical interrupting current"; the Soviet specification on "symmetrical interrupting current." The value was multiplied by 1.2 to convert the 1,500 MVA to the Soviet rating base.

Function

These oil switches are oil-filled circuit breakers used for medium-duty applications in electrical distribution systems.

Comparability

The US analog is a slightly more powerful switch. It has larger contacts than the Soviet model and can open the contacts wider than the Soviet model.

Representativeness

This item is representative of production in both countries. The Soviet model is a standardized item that probably is serially produced. The US model is batch produced and generally is custom tailored to specific requirements.

Electrotechnical Machinery and Equipment

Item Number 36	*Tsennik:*	3 (72); 35
Oil switch	**Rubles:**	2,480
	Dollars:	10,482
	Ruble-Dollar Ratio:	.24

Soviet Model: MPK-35-1000

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated voltage (kV)	35	34.5	99
Rated current (amperes)	1,000	1,200	120
Cutoff capacity (MVA)	1,000	1,200 [1]	120

[1] Calculated. The corresponding US specification, "Nominal 3-Phase MVA," is given as 1,000. However, the Soviet and US rating systems are different. The US specification is based on "asymmetrical interrupting current"; the Soviet specification on "symmetrical interrupting current." The US value was multiplied by 1.2 to convert the 1,000 MVA to the Soviet rating base.

Function

These oil switches are oil-filled circuit breakers used for medium-duty applications in electrical distribution systems.

Comparability

The US analog is slightly superior in performance since it has a 20 percent higher current interrupt capacity.

Representativeness

This item is representative of production in both countries. The Soviet model is a standardized item that probably is serially produced. The US model is batch produced and generally is custom tailored to specific requirements.

Cable Products

Item Number 37	*Tsennik:* *		
Control cable	**Rubles:**	692/km	
	Dollars:	1,602/km	
	Ruble-Dollar Ratio:	.43	
Soviet Model: KVRG			
Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Rubber		
Jacket	Polyvinylchloride (PVC)		
Sheath	None		
Conductor size (mm^2)	1.5		
Number of conductors	4, 5, 7, 10, 14, 19, 27, 37		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Control cable is used in control circuits for applications such as transmitting actuating signals or signals from sensors.

Comparability
The Soviet and US items are identical.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses polyethylene insulation rather than rubber.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 310. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an of eight ratios for this type of cable which vary in number of conductors from four to 37.

Cable Products

Item Number 38	*Tsennik:* *	
Control cable	**Rubles:**	898/km
	Dollars:	1,914/km
	Ruble-Dollar Ratio:	.47

Soviet Model: KVRG

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Copper		
Insulation	Rubber		
Jacket	Polyvinylchloride (PVC)		
Sheath	None		
Conductor size (mm^2)	2.5		
Number of conductors	4, 5, 7, 10, 14, 19, 27, 37		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Control cable is used in control circuits for applications such as transmitting actuating signals or signals from sensors.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 310. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of eight ratios for this type of cable which vary in number of conductors from four to 37.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses polyethylene insulation rather than rubber.

Cable Products

Item Number 39	*Tsennik:* *	
Control cable	**Rubles:**	1,087/km
	Dollars:	2,247/km
	Ruble-Dollar Ratio:	.48

Soviet Model: KVRB

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Rubber		
Jacket	Polyvinylchloride (PVC)		
Sheath	Two steel tapes and outside cover		
Conductor size (mm^2)	1.5		
Number of conductors	4, 5, 7, 10, 14, 19, 27, 37		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Control cable is used in control circuits for applications such as transmitting actuating signals or signals from sensors. This type is armored for mechanical strength.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik*, fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 310. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of eight ratios for this type of cable which vary in number of conductors from four to 37.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses polyethylene insulation rather than rubber.

Cable Products

Item Number 40	*Tsennik:* *	
Control cable	**Rubles:**	1,334/km
	Dollars:	2,665/km
	Ruble-Dollar Ratio:	.50

Soviet Model: KVRB

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Rubber		
Jacket	Polyvinylchloride (PVC)		
Sheath	Two steel tapes and outside cover		
Conductor size (mm^2)	2.5		
Number of conductors	4, 5, 7, 10, 14, 19, 27, 37		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Control cable is used in control circuits for applications such as transmitting actuating signals or signals from sensors. This type is armored for mechanical strength.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik*, fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 310. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of eight ratios for this type of cable which vary in number of conductors from four to 37.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses polyethylene insulation rather than rubber.

Cable Products

Item Number 41	*Tsennik:* *	
Power cable, 1 kV	**Rubles:**	4,000/km
	Dollars:	6,630/km
	Ruble-Dollar Ratio:	.60

Soviet Model: SB

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Copper		
Insulation	Impregnated paper		
Jacket	Lead		
Sheath	Steel tape		
Voltage (kV)	1		
Number of conductors	3		
Conductor size (mm^2)	6, 150		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Power cable of this type is used for the transmission of electrical power at high voltages.

Comparability
The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 310. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of two ratios for this type of cable, one with a conductor size of 6 mm^2 and the other of 150 mm^2.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation without a lead jacket.

Cable Products

Item Number 42	*Tsennik:* *	
Power cable, 6 kV	**Rubles:**	4,000/km
	Dollars:	6,750/km
	Ruble-Dollar Ratio:	.59

Soviet Model: SB

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Copper		
Insulation	Impregnated paper		
Jacket	Lead		
Sheath	Steel tape		
Voltage (kV)	6		
Number of conductors	3		
Conductor size (mm^2)	25, 70		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Power cable of this type is used for the transmission of electrical power at high voltages.

Comparability
The Soviet and US items are identical.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation without a lead jacket.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 279. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of two ratios for this type of cable, one with a conductor size of 25 mm^2 and the other of 70 mm^2.

Cable Products

Item Number 43	*Tsennik:* *	
Power cable, 10 kV	**Rubles:**	5,600/km
	Dollars:	10,350/km
	Ruble-Dollar Ratio:	.54

Soviet Model: SB

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Impregnated paper		
Jacket	Lead		
Sheath	Steel tape		
Voltage (kV)	10		
Number of Conductors	3		
Conductor size (mm^2)	16, 34, 95, 150		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Power cable of this type is used for the transmission of electrical power at high voltages.

Comparability
The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 279. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of four ratios for this type of cable which vary in conductor size from 16 to 150 mm^2.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation without a lead jacket.

Cable Products

Item Number 44	*Tsennik:* *	
Power cable, 35 kV	**Rubles:**	16,475/km
	Dollars:	21,500/km
	Ruble-Dollar Ratio:	.77

Soviet Model: SB

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Copper		
Insulation	Impregnated paper		
Jacket	Lead		
Sheath	Steel tape		
Voltage (kV)	35		
Number of conductors	3		
Conductor size (mm^2)	70, 95, 120, 150		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Power cable of this type is used for the transmission of electrical power at high voltages.

Comparability
The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 279. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of four ratios for this type of cable which vary in conductor size from 70 to 150 mm^2.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation without a lead jacket.

Cable Products

Item Number 45	*Tsennik:* *	
Submarine power cable 6 kV	**Rubles:**	6,200/km
	Dollars:	12,783/km
	Ruble-Dollar Ratio:	.49

Soviet Model: OSK

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Impregnated paper		
Jacket	Lead		
Sheath	Jute and galvanized steel wire		
Voltage (kV)	6		
Number of conductors	3		
Conductor size (mm^2)	16, 70, 150		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Submarine power cable is used for the transmission of electrical power at high voltages. It is armored with steel wire for underwater installation or for vertical suspension in mines and tall buildings.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 281. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of three ratios for this type of cable which vary in conductor size from 16 to 150 mm^2.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation without a lead jacket.

Cable Products

Item Number 46	*Tsennik:* *	
Submarine power cable,10 kV	**Rubles:**	7,167/km
	Dollars:	14,413/km
	Ruble-Dollar Ratio:	.50

Soviet Model: OSK

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Impregnated paper		
Jacket	Lead		
Sheath	Jute and galvanized steel wire		
Voltage (kV)	10		
Number of conductors	3		
Conductor size (mm^2)	16, 70, 150		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Submarine power cable is used for the transmission of electrical power at high voltages. It is armored with steel wire for underwater installation or for vertical suspension in mines and tall buildings.

Comparability
The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 281. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of three ratios for this type of cable which vary in conductor size from 16 to 150 mm^2.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation without a lead jacket.

Cable Products

Item Number 47	*Tsennik:**	
Submarine power cable, 35 kV	**Rubles:**	21,100/km
	Dollars:	27,730/km
	Ruble-Dollar Ratio:	.76

Soviet Model: OSK

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Impregnated paper		
Jacket	Lead		
Sheath	Jute and galvanized steel wire		
Voltage (kV)	35		
Number of conductors	3		
Conductor size (mm^2)	70, 95, 120		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Submarine power cable is used for the transmission of electrical power at high voltages. It is armored with steel wire for underwater installation or for vertical suspension in mines and tall buildings.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik*, fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 281. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of three ratios for this type of cable which vary in conductor size from 70 to 120 mm^2.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation without a lead jacket.

Cable Products

Item Number 48	*Tsennik:**	
Aluminum power cable, 1 kV	**Rubles:**	1,275/km
	Dollars:	3,735/km
	Ruble-Dollar Ratio:	.34

Soviet Model: AAShV

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Aluminum		
Insulation	Impregnated paper		
Jacket	Aluminum		
Sheath	Polyvinylchloride (PVC)		
Voltage (kV)	1		
Number of conductors	2		
Conductor size (mm^2)	10, 120		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Aluminum power cable is used for the transmission of electrical power at high voltages.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 279. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of two ratios for this type of cable, one with a conductor size of 10 mm^2 and the other of 120 mm^2.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded plastic insulation. In the United States, the choice of aluminum or copper is determined largely by the relative prices.

Cable Products

Item Number 49	*Tsennik:**	
Aluminum power cable, 6 kV	**Rubles:**	2,500/km
	Dollars:	7,950/km
	Ruble-Dollar Ratio:	.31
Soviet Model: AAShV		

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Aluminum		
Insulation	Impregnated paper		
Jacket	Aluminum		
Sheath	Polyvinylchloride (PVC)		
Voltage (kV)	6		
Number of conductors	2		
Conductor size (mm^2)	25, 240		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Aluminum power cable is used for the transmission of electrical power at high voltages.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 279. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of two ratios for this type of cable, one with a conductor size of 25 mm^2 and the other of 240 mm^2.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded plastic insulation. In the United States, the choice of aluminum or copper is determined largely by the relative prices.

Cable Products

Item Number 50	*Tsennik:**	
Aluminum power cable, 10 kV	**Rubles:**	1,750/km
	Dollars:	7,035/km
	Ruble-Dollar Ratio:	.25

Soviet Model: AAShV

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Aluminum		
Insulation	Impregnated paper		
Jacket	Aluminum		
Sheath	Polyvinylchloride (PVC)		
Voltage (kV)	10		
Number of conductors	3		
Conductor size (mm^2)	35, 70		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Aluminum power cable is used for the transmission of electrical power at high voltages.

Comparability
The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 279. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of two ratios for this type of cable, one with a conductor size of 35 mm^2 and the other of 70 mm^2.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded plastic insulation. In the United States, the choice of aluminum or copper is determined largely by the relative price.

Cable Products

Item Number 51	*Tsennik:**	
Power cable, 660V	**Rubles:**	3,533/km
	Dollars:	6,293/km
	Ruble-Dollar Ratio:	.56

Soviet Model: SRG

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Copper		
Insulation	Rubber		
Jacket	Lead		
Voltage (V)	660		
Number of conductors	3		
Conductor size (mm^2)	6, 70, 120		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Power cable of this type is used for the distribution of electrical power at low voltages.

Comparability
The Soviet and US items are identical.

* No *Tsennik* price is available. The average enterprise wholesale ruble price is from *Elektrotechnicheskiy spravochnik,* fourth edition, Vol. I, Book 1, Energiya, Moscow, 1971, page 279. The average dollar price is f.o.b. factory. The ruble-dollar ratio is an average of three ratios for this type of cable which vary in conductor size from 6 to 120 mm^2.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type uses extruded polyethylene insulation rather than rubber.

Cable Products

Item Number 52	*Tsennik:**	
Coaxial telephone cable	**Rubles:**	7,800/km
	Dollars:	22,422/km
	Ruble-Dollar Ratio:	.35

Soviet Model: KMB-4

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation			
Coaxial tubes	Polyethylene discs		
Quads	Paper		
Jacket	Paper tape, lead sheath		
Armor	Steel tape		
Sheath	Bitumen impregnated yarn		
Number of coaxial tubes	4		
Inner/outer diameter (mm)	2.52/9.4		
Number of service quads	5		
Quad conductor diameter (mm)	0.9		
Capacity (channels per tube)	960		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
Coaxial telephone cable of this type is used for long distance communications with a capacity of up to several thousand two-way telephone channels.

Comparability
The Soviet and US items are identical.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, modern US cables tend to be of much higher capacity, on the order of 3,000 to 4,000 channels per tube.

* No *Tsennik* price is available. A similar type of price was obtained from *Sbornik 25, Ukrupnennykh pokazateley vosstanovitel'noy stoimosti zdaniy i sooruzheniy svyazi dlya pereotsenki osnovnykh fondov,* "Meditsina," Moscow, 1970, Entry No. 449, page 60.

Cable Products

Item Number 53	*Tsennik:**	
Symmetrical telephone cable, 4-quad	**Rubles:**	2,770/km
	Dollars:	8,903/km
	Ruble-Dollar Ratio:	.31

Soviet Model: MKSB

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Sytroflex		
Armor	Steel tape		
Sheath	Lead		
Outer covering	Bitumen impregnated yarn		
Conductor diameter (mm)	1.2		
Number of quads	4		
Number of pairs per quad	2		
Capacitance (nf/km)	24.5		
Capacity (channels)	192		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Symmetrical telephone cable is used for long distance communications. It has a capacity of 24 telephone channels per pair of conductors.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. A similar type of price was obtained from *Sbornik 25, Ukrupnennykh pokazateley vosstanovitel'noy stoimosti zdaniy i sooruzheniy svyazi dlya pereotsenki osnovnykh fondov,* "Meditsina," Moscow, 1970, Entry No. 368, page 56.

Representativeness

This item is more representative of Soviet production. In the United States, cable of this capacity normally is either of coaxial construction or designed for use with modern digital modulation equipment.

Cable Products

Item Number 54	*Tsennik:**	
Spiral telephone cable, 24-quad	**Rubles:**	3,250/km
	Dollars:	6,816/km
	Ruble-Dollar Ratio:	.48

Soviet Model: TZG

Specifications:	**USSR**	**US** [1]	**Difference** (US as percent of USSR)
Conductor material	Copper		
Insulation	Paper		
Sheath	Lead		
Conductor diameter (mm)	0.8		
Number of quads	24		
Number of pairs per quad	2		
Capacitance (nf/km)			
Nominal	30		
Maximum	36		
Capacity (channels)	576		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Spiral telelphone cable is used for low-capacity telephone communications and is designed for laying in a conduit. It has a capacity of 12 channels per pair.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. A similar type of price was obtained from *Sbornik 25, Ukrupnennykh pokazateley vosstanovitel'noy stoimosti zdaniy i sooruzheniy svyazi dlya pereotsenki osnovnykh fondov,* "Meditsina," Moscow, 1970, Entry No. 553, page 69.

Representativeness

This item is more representative of Soviet production. In the United States, most cable of this capacity is cheaper and simpler than this item and is used for the transmission of digital data. Digital transmission is less demanding on the transmission media and permits the use of cable of less stringent specifications.

Cable Products

Item Number 55	*Tsennik:**	
Municipal telephone cable	**Rubles:**	7,100/km
	Dollars:	16,532/km
	Ruble-Dollar Ratio:	.43

Soviet Model: TB

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Copper		
Insulation	Paper		
Armor	Steel tape		
Sheath	Lead		
Outer cover	Cable yarn		
Conductor diameter (mm)	0.5		
Number of pairs			
Operating	300		
Reserve	2		
Capacitance (nf/km)			
Nominal	50		
Maximum	55		
Capacity (channels)	300		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function
This cable is used for intraurban telephone communications. It has a capacity of one channel per pair of conductors.

Comparability
The Soviet and US items are identical.

Representativeness
This item is more representative of Soviet production. Although produced in large quantities in the United States, most US cable of this type normally is of higher capacity and uses pulp rather than paper insulation.

* No *Tsennik* price is available. A similar type of price was obtained from *Sbornik 25, Ukrupnennykh pokazateley vosstanovitel'noy stoimosti zdaniy i sooruzheniy svyazi dlya pereotsenki osnovnykh fondov,* "Meditsina," Moscow, 1970, Entry No. 986, page 91.

Cable Products

Item Number 56	*Tsennik:**	
Telephone distribution cable	**Rubles:**	980/km
	Dollars:	1,640/km
	Ruble-Dollar Ratio:	.60

Soviet Model: TRVKSh

Specifications:	USSR	US [1]	Difference (US as percent of USSR)
Conductor material	Copper		
Insulation	Enamel/polyvinylchloride (PVC)		
Sheath	Polyvinylchloride (PVC)		
Outer shield	Metallized paper		
Conductor diameter (mm)	0.5		
Number of pairs	20		
Capacity (channels)	20		

[1] US manufacturers generally manufacture cable to buyer specifications. Hence, the US specifications for this cable match those of the Soviet cable. Cable is a unique problem in that physical characteristics tend to be functional or performance characteristics as well.

Function

Telephone distribution cable is intended for distribution of subscriber lines of the local telephone network. This cable has a capacity of one channel per pair of conductors.

Comparability

The Soviet and US items are identical.

* No *Tsennik* price is available. A similar type of price was obtained from *Sbornik 25, Ukrupnennykh pokazateley vosstanovitel'noy stoimosti zdaniy i sooruzheniy svyazi dlya pereotsenki osnovnykh fondov,* "Meditsina," Moscow, 1970, Entry No. 1082, page 95.

Representativeness

This item is more representative of Soviet production. Although produced in large quantities in the United States, US cable of this type normally is of higher capacity and uses polyvinylchloride insulation rather than enamel/polyvinylchloride.

Machine Tools

Item Number 57	*Tsennik:*	11 (72): 265
Engine Lathe	**Rubles:**	2,260
	Dollars:	7,161
	Ruble-Dollar Ratio:	.32

Soviet Model: 1K62

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Swing over bed (mm)	400	435	109
Swing over cross slide (mm)	220	267	121
Distance between centers (mm)	1,400	1,370	98
Spindle speed (rpm)			
Minimum [1]	12	15	125
Maximum	2,000	1,580	79
Power of the main drive (kW)	10	7.5	75
Weight (kg)	2,200	2,030	92

[1] The lower the numerical value of the specification, the greater the capability.

Function

Engine lathes are general all-purpose machine tools designed to generate cylindrical forms from revolving workpieces.

Comparability

The Soviet and US lathes are roughly comparable in performance. The US analog can handle a part of slightly larger diameter but has less power and weight than the Soviet model. These differences are not significant; US motors are conservatively rated and power actually available to the US model is greater than indicated. Moreover, the US model has adequate rigidity to handle large workloads, despite its lighter weight, because of superior construction. The Soviet lathe is an old model that reflects the technology of the 1950s. The larger range of spindle speeds of the Soviet lathe reflects the smaller Soviet assortment of lathes. The USSR tries to satisfy its need for lathes with a minimum assortment in order to achieve large-scale production.

Representativeness

This item is representative of production in both countries. The Soviet 1K62 is mass produced on a moving assembly line. The US model is produced in small batches.

Machine Tools

Item Number 58	***Tsennik:***	11 (72); 300
Engine lathe	**Rubles:**	4,420
	Dollars:	26,071
	Ruble-Dollar Ratio:	.17

Soviet Model: 163

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Swing over bed (mm)	630	635	101
Swing over cross slide (mm)	340	406	119
Distance between centers (mm)	1,400	1,372	98
Spindle speed (rpm)			
Minimum [1]	10	15	150
Maximum	1,250	1,000	80
Feed (mm/rev)			
Minimum [1]	0.1	0.038	38
Maximum	3.2	2.31	72
Power of the main drive (kW)	14	15	107
Weight (kg)	3,800	4,093	108

[1] The lower the numerical value of the specification, the greater the capability.

Function
Engine lathes are general all-purpose machine tools designed to generate cylindrical forms from revolving workpieces.

Comparability
The Soviet and US lathes are designed to handle the same sized workpieces. The US analog has a higher spindle speed on large diameter parts (15 rpm) but a slower feed rate (2.31 mm/rev). On balance, the metal removal rates of the two machines are similar. The US lathe is slightly more powerful and heavier, but the differences are not significant.

Representativeness
This item is representative of production in both countries. The Soviet model is series produced. The US model is produced in small batches.

Machine Tools

Item Number 59	*Tsennik:*	11 (72); 563
Jig borer	**Rubles:**	21,090
	Dollars:	43,412
	Ruble-Dollar Ratio:	.49

Soviet Model: 2A450

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum boring diameter (mm)	250	178	71
Maximum drilling diameter (mm)	30	38	127
Accuracy in positioning table (mm)[1]	.004	.005	125
Table size (mm)			
Length	1,100	1,270	115
Width	630	635	101
Maximum table travel speed (mm/min)	1,200	1,270	106
Maximum spindle feed (mm/rev)	.16	.58	362
Power of the main drive (kW)	2	3.7	185
Weight (kg)	6,600	6,577	100

[1] The lower the numerical value of the specification, the greater the capability.

Function

Jig borers are used for precision machining of holes where extreme accuracy is required in the location of holes. Jig borers can perform other machining operations also, such as drilling, boring, reaming, facing, and occasionally milling.

Comparability

The US analog is more productive than the Soviet model. Its maximum spindle feed is nearly four times that of the Soviet model, and it has the extra power to utilize the faster feed. In addition, the higher table travel speed of the US analog enables it to reposition and begin cutting more quickly than the Soviet jig borer. The US model also is capable of handling slightly larger parts. The US specification for positioning accuracy reflects conversion to millimeters of a number that has been rounded in inches. The true unrounded specification for the US machine could show the same or even greater accuracy in millimeters.

Representativeness

This item is more representative of Soviet production. Jig borers are a small share of US output of metalcutting machine tools, and a relatively larger share of Soviet output. The Soviet model is in small series production; the US model is batch produced.

Machine Tools

Item Number 60	***Tsennik:***	11 (72); 525
Horizontal boring mill	**Rubles:**	28,350
	Dollars:	85,664
	Ruble-Dollar Ratio:	.33

Soviet Model: 2622P

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Spindle diameter (mm)	110	101.6	92
Boring diameter (mm)	350	355.6	102
Table size (mm)			
Length	1,120	914	82
Width	1,300	1,575	121
Maximum table travel (mm)			
Longitudinal	1,090	1,219	112
Cross	1,000	1,524	152
Feed rate of table and headstock (mm/min)			
Minimum	1.4	1.4	100
Maximum	1,110	1,900	171
Spindle speed (rpm)			
Minimum [1]	12.5	15	120
Maximum	1,600	1,550	97
Power of the main drive (kW)	10	14.9	149
Weight (kg)	12,000	13,590	113

[1] The lower the numerical value of the specification, the greater the capability.

Function

Horizontal boring mills are designed to bore holes in large parts. They are capable also of milling, drilling, reaming, tapping, and threading. They differ from vertical boring mills in that in the latter the work is rotated whereas in a horizontal boring mill the work is stationary.

Comparability

The US and Soviet boring mills are similar in function, but the US analog probably is more productive since it has greater power and higher maximum feed rates.

Representativeness

This item is more representative of Soviet production. Horizontal boring machines are batch produced in the United States to order and in small quantities. The Soviet model is series produced, and annual output is believed to be substantially larger than in the United States.

Machine Tools

Item Number 61	***Tsennik:***	11 (72); 1137
Universal milling machine	**Rubles:**	2,570
	Dollars:	28,980
	Ruble-Dollar Ratio:	.09

Soviet Model: 6M82

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Table Size (mm)			
Length	1,250	1,505	120
Width	320	356	111
Maximum table travel (mm)			
Length	700	711	102
Width	260	305	117
Vertical	380	457	120
Table feeds (mm/min)			
Length and width	25-1,250	9.5-2,286	38-183
Range	1,225	2,276.5	186
Vertical	8.3-416	4.8-1,143	58-275
Range	407.7	1,138.2	279
Rapid traverse of table (mm/min)			
Length and width	3,000	3,810	127
Vertical	1,000	1,905	190
Spindle speed (rpm)			
Minimum [1]	31.5	18	57
Maximum	1,600	1,800	112
Power of the main drive (kW)	7.0	7.5	107
Weight (kg)	2,800	3,873	138

[1] The lower the numerical value of the specification, the greater the capability.

Function
Milling machines are used to machine flat surfaces where speed of machining and smoothness are important. Universal milling machines are used in small-lot production of such items as gears, splines, keyways, and slots, and in tooling and repair work where a large variety of milling setups are encountered.

Comparability
The US analog can handle larger parts, a greater variety of parts, and can mill them at faster speeds than the Soviet model. Also, because the US analog has more weight and rigidity, as well as faster feeds and traverse speeds, it is more suitable for the production shop. The Soviet model, by contrast, is best suited for lighter duty in toolroom and repair shop applications.

Representativeness
This item is more representative of Soviet production. Milling machines represent roughly 10 percent of US machine tool output by value and a somewhat larger share of Soviet output. The US model is batch produced. The Soviet model is series produced.

Machine Tools

Item Number 62	*Tsennik:*	11 (72); 1136
Universal milling machine	**Rubles:**	2,030
	Dollars:	26,739
	Ruble-Dollar Ratio:	.08
Soviet Model: 6N81		

Specifications:	USSR	US	Difference (US as percent of USSR)
Table size (mm)			
Length	1,000	1,422	142
Width	250	305	122
Maximum table travel (mm)			
Length	600	711	118
Width	200	254	127
Vertical	350	457	131
Table Feeds (mm/min)			
Length	35-980	6.3-812	18-83
Range	945	805.7	85
Width	25-765	6.3-812	25-106
Range	740	805.7	109
Vertical	12-380	3.1-406	26-107
Range	368	402.9	109
Rapid traverse of table (mm/min)			
Length	2,900	3,810	131
Width	2,300	3,810	166
Vertical	1,150	1,905	166
Spindle speed (rpm)			
Minimum [1]	65	25	38
Maximum	1,800	2,000	111
Power of the main drive (kW)	4.5	3.73	83
Weight (kg)	2,100	2,763	132

[1] The lower the numerical value of the specification, the greater the capability.

Function

Milling machines are used to machine flat surfaces where speed of machining and smoothness are important. Universal milling machines are used in small-lot production of such items as gears, splines, keyways, and slots, and in tooling and repair work where a large variety of milling setups are encountered.

Comparability

The US analog can handle larger workpieces, has a wider range of spindle speeds for both roughing and finishing cuts, has greater rigidity, and can be repositioned more quickly between cuts than can the Soviet model. Nevertheless, in a toolroom or repair shop environment, the productivity of the two models would be similar. The US analog would perform better in a production shop environment.

Representativeness

This item is more representative of Soviet production. Milling machines represent 10 percent of US machine tool output by value and a somewhat larger share of Soviet output. The US model is produced in very small volume, the Soviet model in larger quantities.

Machine Tools

Item Number 63	*Tsennik:*	11 (72); 1265
Copy milling machine	**Rubles:**	72,830
	Dollars:	151,120
	Ruble-Dollar Ratio:	.48

Soviet Model: LR-93A

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum surface machined (mm)			
Length	2,250	2,438	108
Width	1,120	1,016	91
Work feeds (mm/min)			
Minimum	6	25.4	423
Maximum	500	1,270	254
Rapid traverse (mm/min)			
Longitudinal and crosswise	3,000	4,445	148
Vertical	1,500	4,445	296
Spindle speed (rpm)			
Minimum [1]	35.5	16	45
Maximum	1,800	1,600	89
Power of the main drive (kW)	10.2	22.4	220
Weight (kg)	35,500	29,890	84

[1] The lower the numerical value of the specification, the greater the capability.

Function

While tracing a master blank, copy milling machines simultaneously reproduce the irregular or complex shapes of dies, molds, cams, airfoil surfaces, and aircraft parts.

Comparability

The US and Soviet machines are designed to machine parts of the same approximate size. However, the US analog probably is more productive than its Soviet counterpart since it has a more rapid feed across the workpiece and extra power. Also, the US analog has a much faster rapid traverse which means the machine loses less time getting positioned between cuts.

Representativeness

This item is more representative of Soviet production. Few copy milling machines were produced in the US in 1972, having been supplanted by multiaxis numerically controlled machine tools. They are produced only on order. The USSR, however, which was not producing multiaxis numerically controlled machine tools in 1967, is believed to have produced copy milling machines in fairly large volume. The Soviet LR-93A model was serially produced in small quantities.

Machine Tools

Item Number 64	*Tsennik:*	11 (72); 109
Automatic chucking machine	**Rubles:**	5,660
	Dollars:	35,788
	Ruble-Dollar Ratio:	.16

Soviet Model: 1416

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (mm)			
Maximum diameter	160	152	95
Maximum length	100	76	76
Spindle speed (rpm)			
Minimum [1]	63	87	138
Maximum	2,000	2,507	125
Power of the main drive (kW)	5.5	5.6	102
Weight (kg)	2,900	2,760	95

[1] The lower the numerical value of the specification, the greater the capability.

Function
Automatic chucking machines are designed to machine cylindrical parts which cannot be held between centers. They are suited for turning, drilling, boring, counterboring, reaming, facing, and grooving operations.

Comparability
The US and Soviet machines are designed to handle parts of virtually the same diameter. However, the Soviet machine is capable of handling a somewhat larger workpiece. The US machine has significantly higher spindle speeds, indicating relatively higher productivity.

Representativeness
This item is representative of production in both countries. Single spindle automatic chucking machines represented roughly 3 to 4 percent of US output of machine tools by value during the early 1970s. Although exact figures for the USSR are not available, chucking machines are estimated at a minimum of 5 percent of Soviet output in the late 1960s.

Machine Tools

Item Number 65	*Tsennik:*	11 (72); 1055
Spiral bevel and hypoid gear generator	**Rubles:**	23,950
	Dollars:	98,195
	Ruble-Dollar Ratio:	.24

Soviet Model: 528S

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum pitch diameter at spiral angle of 30° (mm)			
Gearing Ratio 10:1	840	838	100
Gearing Ratio 2:1	750	750	100
Maximum number of teeth cut	100	100	100
Feed range (seconds/tooth)			
Minimum [1]	7.5	23	307
Maximum	240	333	139
Power of the main drive (kW)	10	5.6	56
Weight (kg)	12,500	11,793	94

[1] The lower the numerical value of the specification, the greater the capability.

Function

These machines are designed to cut spiral bevel gears. A typical use for the gears cut with these machines is in the axles of trucks and cars.

Comparability

The Soviet model is a copy of the US analog. The major design difference is the greater speed of feed of the Soviet model. However, even though the Soviet model is heavier than its US counterpart it lacks sufficient weight and rigidity to provide high quality tooth surface at its high feed rates.

Representativeness

This item is more representative of US production. Bevel and hypid gear generators were produced in relatively large volume in the USSR in 1967 and in the United States in 1972, but the United States is the acknowledged world leader in this area of machine tool technology and supplies most of the industrialized countries, including the USSR.

Machine Tools

Item Number 66	*Tsennik:*	11 (72); 739
Internal grinding machine	**Rubles:**	9,200
	Dollars:	36,263
	Ruble-Dollar Ratio:	.25

Soviet Model: 3A228

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Diameter of hole that can be ground (mm)			
Minimum [1]	50	3.2	6
Maximum	200	200	100
Maximum depth of hole that can be ground (mm)	200	305	152
Maximum diameter of work that can be ground (mm)	560	508	91
Accuracy of hole ground (mm)			
Ovality	.005	.005	100
Conicity [1]	.008	.005	62
Grinding wheel spindle speed (rpm)			
Minimum	4,500	6,500	144
Maximum	14,800	8,500	57
Power of the main drive (kW)	5.5	5.6	102
Weight (kg)	4,975	3,217	65

[1] The lower the numerical value of the specification, the greater the capability.

Function
Internal grinding machines are designed for grinding cylindrical and tapered holes. Manually operated models are used where production is small or varied, as in job shops or tool grinding rooms.

Comparability
The US and Soviet models are similar in function, but the US analog is capable of grinding a smaller and more accurate hole and to a greater depth. The Soviet model accepts a larger diameter part, has a much wider range of spindle speeds, and weighs more. Since it has no more power than the US analog, it probably is no more productive in operation. Although the US analog is a precision toolroom grinder while the Soviet model is a production line type, the comparison is valid since the Soviet model can operate also in a toolroom situation. However, toolroom grinders tend to be more expensive than production line grinders, and the ratio, therefore, is accordingly lower.

Representativeness
This item is more representative of US production. Although grinding machines, including internal grinders, represent 15 to 20 percent of the value of US output of metalcutting machine tools, this particular model is only produced in small batches of a half dozen or less. Grinding machines are believed to represent a much smaller share of Soviet output. The Soviet model is believed to be serially produced.

Machine Tools

Item Number 67	*Tsennik:*	11 (72); 710
Centerless grinding machine (manual-type)	**Rubles:**	4,470
	Dollars:	9,394
	Ruble-Dollar Ratio:	.48

Soviet Model: 3G182

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Grinding diameter (mm)			
Minimum [1]	0.8	0.1	12
Maximum	25	38	152
Accuracy of workpiece (mm)[1, 2]	.002	.001	50
Grinding wheel speeds (rpm)			
Minimum	1,910	2,040	107
Maximum	2,720	2,040	75
Regulating wheel speeds (rpm)			
Minimum	19	30	158
Maximum	190	480	253
Power of the main drive (kW)	7	5.6	80
Weight (kg)	2,450	1,043	44

[1] The lower the numerical value of the specification, the greater the capability.
[2] Out of round.

Function
Centerless grinders are used to grind cylindrical surfaces on parts which cannot conveniently be held between centers. Manually operated centerless grinders are used when production is not large enough or is too varied to justify use of automatic grinders.

Comparability
The US grinder is 20 percent less powerful and weighs less than one-half as much as its Soviet counterpart. A substantial portion of the weight differential, however, is accounted for by the US company's use of weldments and other modern construction techniques designed to maintain rigidity while reducing weight. Despite the power and weight differentials, the US analog can produce both smaller and larger, as well as more accurate, parts than the Soviet model.

Representativeness
This item is more representative of US production. In the United States, grinding machines represent 15 to 20 percent of machine tool production, although output of this particular model probably did not exceed two dozen units in 1972. In the USSR, grinding machines probably accounted for perhaps 5 to 10 percent of machine tool production in the late 1960s. Soviet model 3G182 has been series produced since the early 1960s.

Machine Tools

Item Number 68	*Tsennik:*	11 (72); 626
Cylindrical grinding machine (manual-type)	**Rubles:**	6,070
	Dollars:	42,426
	Ruble-Dollar Ratio:	.14

Soviet Model: 3B151

Specifications:	USSR	US	Difference (US as percent of USSR)
Distance between centers (mm)	700	762	109
Diameter over swing (mm)	200	254	127
Table traverse speed (mm/min)			
Minimum [1]	100	51	51
Maximum	6,000	6,096	102
Power to the wheel (kW)	7.5	5.6	75
Weight (kg)	4,200	3,357	80

[1] The lower the numerical value of the specification, the greater the capability.

Function
Cylindrical grinders machine and provide high surface finishes to cylindrical parts. Manually operated machines are used primarily in job shops and tool grinding rooms where production is too low or too varied to justify using semiautomatic or automatic machinery.

Comparability
The US analog is capable of handling a longer part (distance between centers) and a larger diameter part than the Soviet model. The Soviet model is heavier because it represents older technology. The US analog, despite its weight, probably has the rigidity needed to handle heavy workloads because of the use of superior metal alloys and construction techniques. The slower table traverse of the US model is not significant. It reflects the fact that it can handle a part of larger diameter.

Representativeness
This item is more representative of US production. In the United States, grinding machines represent 15 to 20 percent of machine tool output; in the USSR, perhaps 5 to 10 percent. This particular Soviet model is series produced. This particular US model is batch produced.

Machine Tools

Item Number 69 (foreign model)	***Tsennik:***	11 (72); 1038
Spur and helical gear grinder	**Rubles:**	82,360
	Dollars:	129,488
	Ruble Dollar Ratio:	.64

Soviet Model: 5851

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum gear diameter (mm)	320	320	100
Number of teeth			
Minimum	10	10	100
Maximum	120	180	150
Maximum weight of workpiece (kg)			
Between centers	10	20	200
With work rest	30	60	200
Grinding wheel diameter (mm)			
Minimum	165	200	121
Maximum	225	280	124
Maximum table feed (mm/min)	1,800	1,800	100
Table traverse speed (mm/min)	3,200	3,000	94
Weight (kg)	5,500	6,387	116

Function
Automatic spur and helical gear grinding machines are designed to produce involute tooth profiles of spur and helical gears in lot and mass production.

Comparability
Both models are designed to machine the same sized gears. However, the analog can handle heavier workpieces than the Soviet model and can grind more teeth per gear. Machine productivity appears to be similar, since the speed with which the table moves (traverse speed) and is fed by the grinder (table feed) are practically the same.

Representativeness
This item is more representative of Soviet production. The US produces gear grinders but not in this size, and the analog, therefore, is foreign made. Less than 50 are imported annually. The Soviet model probably is produced in small quantities.

Machine Tools

Item Number 70	*Tsennik:*	11 (72); 1372
Vertical external broaching machine	**Rubles:**	8,930
	Dollars:	86,300
	Ruble-Dollar Ratio:	.10

Soviet Model: 776

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated pull capacity (ton force)	20	22.5	112
Ram working surface (mm)			
Length	500	508	102
Width	1,910	1,829	96
Ram work stroke			
Length (mm)	1,250	1,372	110
Speed (m/min)	8.5	8.5	100
Power of the main drive (kW)	22	29.9	136
Weight (kg)	7,750	9,585	124

Function
Vertical external broachers are designed for machining flat surfaces. A cutting tool having multiple cutting edges along its length is pulled linearly over the workpiece surface to remove metal. Each successive cutting tooth removes a small amount of the total stock to be machined.

Comparability
The US analog has greater pulling capacity, longer work stroke, and more weight and power. This indicates that the analog can take heavier cuts than the Soviet model.

Representativeness
This item is representative of production in both countries, accounting in each case for a very small percentage of machine tool output. The USSR probably produces its model in small series. In the United States, vertical broachers are batch produced.

Machine Tools

Item Number 71	*Tsennik:*	11 (72); 41
Six-spindle automatic bar machine	**Rubles:**	14,870
	Dollars:	39,997
	Ruble-Dollar Ratio:	.37

Soviet Model: 1A225-6

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum bar capacity (mm)			
Round (diameter)	25	25.4	102
Hexagonal (across flats)	22	22.2	101
Square (side)	17	19	112
Maximum length of stock feed (mm)	150	157.2	105
Spindle speed (rpm)			
Minimum [1]	280	215	77
Maximum	2,560	3,683	144
Power of the main drive (kW)	14	11.2	80
Weight (kg)	6,200	6,523	105

[1] The lower the numerical value of the specification, the greater the capability.

Function

Multispindle bar automatics are designed for large series production of parts made from bar or tube stock. The spindles, which operate simultaneously, can perform operations such as rough and finish turning, facing, drilling, boring, counterboring, reaming, and cutting external and internal threads.

Comparability

The US and Soviet bar machines are designed to accept the same size of bar stock. The Soviet model has 20 percent more power but weighs less than the US analog. The lighter weight may indicate that the Soviet model does not have sufficient rigidity to utilize the extra power. The US analog has a wider range of spindle speeds which suggests that it may be more productive than the Soviet model. However, productivity also depends crucially upon feed rates, and this specification is missing from both models.

Representativeness

This item is representative of production and is produced in moderate quantities in both countries. This particular Soviet model has been serially produced in the USSR since the early 1960s. This particular US analog was batch produced at the rate of 20 to 30 units annually in the early 1970s.

Machine Tools

Item Number 72	*Tsennik:*	11 (72); 131
Vertical boring and turning mill	**Rubles:**	18,050
	Dollars:	167,377
	Ruble-Dollar Ratio:	.11

Soviet Model: 1541

Specifications:	USSR	US	Difference (US as percent of USSR)
Work table diameter (mm)	1,400	1,422	102
Maximum workpiece dimensions (mm)			
Diameter	1,600	1,727	108
Height	1,000	1,219	122
Maximum table speed (rpm)	200	200	100
Range of head feeds (mm per table revolution)			
Minimum [1]	.04	.025	62
Maximum	16	13.7	86
Rapid traverse (mm/min)			
Side heads	2,500	2,740	110
Cross rail	400	3,200	800
Power of the main drive (kW)	28	29.8	106
Weight (kg)	18,000	34,880	194

[1] The lower the numerical value of the specification, the greater the capability.

Function

Vertical boring and turning mills are designed for machining workpieces that are too large or heavy for lathes. They are capable of a variety of functions: cylindrical and taper turning, boring, facing, undercutting, drilling, counterboring, and reaming. Cutting tools are mounted in tool holders on vertical and side heads. The vertical heads are mounted on a cross rail.

Comparability

The US and Soviet mills are similar in function, but the US analog weighs nearly twice as much—and, hence, is more rigid—and handles both larger and heavier workpieces. Power to the main drive is closely matched, but motor power on US machine tools tends to be rated conservatively. The relatively greater power and rigidity of the US analog indicates that it can take deeper and more accurate cuts. Also, the higher rapid traverse speeds of the side head and cross rail, which provides quick positioning of the cutting tools, implies that the US analog is more productive than the Soviet model.

Representativeness

This item is representative of production and is produced in relatively small numbers in both countries. In the USSR they are produced in small series. In the United States they are built on order.

Machine Tools

Item Number 73	***Tsennik:***	11 (72); 1328
Hydraulic shaper	**Rubles:**	4,460
	Dollars:	19,778
	Ruble-Dollar Ratio:	.23

Soviet Model: 7M36

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Table size (mm)			
Length	700	711	102
Width	450	356	79
Maximum table travel (mm)			
Horizontal	700	774.7	111
Vertical	320	333.3	104
Ram speed (m/min)	3-48	3-30.48	100-63
Range	45	27.48	61
Ram cutting force (kgf) [1]	2,800	1,871	67
Maximum ram stroke (mm)	700	762	109
Table feed per ram double stroke (mm)			
Horizontal	0.25-5	0.05-2.79	20-56
Range	4.75	2.74	58
Vertical	0.15-1.05	0.025-0.457	17-44
Range	0.90	0.432	48
Power of the main drive (kw)	7.5	7.46	99
Weight (kg)	3,300	3,579	108

[1] Kilograms of force.

Function
Shapers are used in toolrooms, die shops, and in small-scale manufacturing operations to machine flat surfaces in horizontal, vertical, or angular planes.

Comparability
The US and Soviet shapers are similar in function. The US analog, however, is designed to handle a slightly larger workpiece, as indicated by its longer ram stroke, greater table size, and table travel. The Soviet model is capable of taking larger feeds, an important factor affecting productivity. However, the larger feeds require a heavier ram cutting force, and the motor on the Soviet shaper is not sufficiently powerful to provide both the larger feeds and the heavy ram cutting force simultaneously. Therefore, the potentially greater productivity of larger feeds may be offset by having to operate at slower ram speeds.

Representativeness
This item is representative of production in both countries, accounting in each case for an extremely small percentage of machine tool output.

Machine Tools

Item Number 74	*Tsennik:*	11 (72); 1287
Double-housing planer	**Rubles:**	23,650
	Dollars:	76,395
	Ruble-Dollar Ratio:	.31

Soviet Model: 7210

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum workpiece size (mm)			
Length	3,000	3,048	102
Width	900	940	104
Height	1,000	1,118	112
Maximum workpiece weight (kg)	4,500	19,241	428
Table Speed (m/min)	4-90	3.05-91.4	76-102
Range	86	88.35	103
Tool head feed per table double stroke (mm)	0.25-25	0.13-25.4	52-102
Range	24.75	25.27	102
Maximum traction force on rack (kgf) [1]	7,000	16,308	233
Power of the main drive (kW)	75	74.5	99
Weight (kg)	27,500	22,197	81

[1] Kilograms of force: the maximum force which can be applied to a linear gear called the rack.

Function
Planers are designed to machine flat surfaces on large and heavy workpieces. Double-housing planers have two vertical columns which support a cross rail. Cutting heads are located on each column and on the cross rail. In operation, the table and workpiece are reciprocated past the cutting tools.

Comparability
The US and Soviet planers are similar in function. The US analog, however, can handle larger and heavier workpieces. The rack on the US model can withstand a much greater traction force than that of the Soviet model. With a sturdier rack, the US planer probably can support deeper cuts than the Soviet model at lowest table speeds.

Representativeness
This item is more representative of Soviet production. Only a handful of planers were produced in the United States in 1972; several hundred were produced in the USSR in 1967.

Machine Tools

Item Number 75	*Tsennik:*	11 (72); 955
Semiautomatic gear hobbing machine	**Rubles:**	8,100
	Dollars:	36,605
	Ruble-Dollar Ratio:	.22

Soviet model: 5A312

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum spur gear diameter (mm)	320	203	63
Table diameter (mm)	260	165	63
Table rapid traverse (mm/min)	460	2,000	435
Power of the main drive (kW)	7.5	7.5	100
Weight (kg)	5,150	5,472	106

Function
Gear hobbing machines have a cylindrical shaped cutting tool, called a hob, which cuts several teeth simultaneously as the gear blank is rotated past it.

Comparability
The Soviet model can machine substantially larger diameter gears than can the US analog. However, the Soviet model does not have sufficient weight or power to make heavy cuts on larger diameter parts. In practice, the Soviet model probably machines parts in the size range of the US analog. The table speed on the US analog (rapid traverse) is more than four times that of the Soviet model, but on this size of gear hobber table traverse speed has little effect on productivity.

Representativeness
This item is more representative of Soviet production. Although gear-cutting equipment is widely used in the United States, relatively few gear hobbers of this size are produced, probably about 100 to 125 in 1972. The USSR, on the other hand, is believed to have produced gear hobbers in much larger quantities in the late 1960s.

Machine Tools
(Woodworking and Sawmill Equipment)

Item Number 76	***Tsennik:***	30 (73); 64
Circular crosscut saw	**Rubles:**	600
	Dollars:	2,867
	Ruble-Dollar Ratio:	.21

Soviet Model: TsME-2M

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Number of blades	1	1	100
Maximum diameter of saw blade (mm)	500	508	102
Maximum width of board sawn (mm)	500	508	102
Maximum thickness of board sawn (mm)	120	152	127
Power feed	No	No	—
Power of electric motor (kW)	3.2	3.73	117
Weight (kg)	450	634	141

Function
Circular crosscut saws of this type are simple cutoff saws used in lumber yards, cabinet shops, and other moderate-scale production applications.

Comparability
The US analog appears to be able to saw through a thicker board, but such may not actually be the case. Unless there is a design characteristic not apparent from available information, the Soviet model, with a blade similar in size to that of the US model, should be able to saw through a board of similar thickness. That there is a difference in the data suggests that the Soviet saw may be rated on a basis that is more conservative than simple clearance for the motor, which is the basis for the figure on the US saw.

Representativeness
This item is more representative of Soviet production. Circular crosscut saws are manufactured on a large scale in the United States, but the manual-feed models like those described here have been replaced in large part either by heavy-duty power-feed industrial saws or by multipurpose radial arm saws with adjustable rather than fixed miter and bevel angles. Less than a dozen of the US model was produced annually in the early 1970s. The Soviet model probably was produced in significantly larger quantities in the late 1960s.

Errata

The following should be substituted as indicated in Volume I, *USSR and the United States: Price Ratios for Machinery, 1967 Rubles - 1972 Dollars*, ER 80-10410 dated September 1980.

Page	Location	Change	
		From	To
14	Footnote 9	Power	Powell
42	Tabulation	0.626	0.628
49	First paragraph		
	line 7 and 18	Table 14	Table 14A
	line 19 and 20	Tabulation	Table 14B
	Second paragraph		
	line 1	Tabulation	Table 14B

Machine Tools
(Woodworking and Sawmill Equipment)

Item Number: 77	***Tsennik:***	30 (73); 133
Double-end tenoning machine	**Rubles:**	5,420
	Dollars:	38,216
	Ruble-Dollar Ratio:	.14

Soviet Model: ShD15-3

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum size of stock that can be worked (mm)			
Length	2,800	3,048	109
Width	1,200 [1]	1,219	102
Thickness	150	152	101
Working dimensions (mm)			
Maximum length of tenon	160	191	119
Maximum height of tenon shoulder	40	76	190
Maximum depth of slot	125	127	102
Number of saws	2	2	100
Number of cutting heads	6	6	100
Range of feed speeds (m/min)	2.5-10	6.1-18.3	244-183
Power of electric motors (kW)	24.7	32.8	133
Weight (kg)	3,858	6,349	165

[1] Appears as 200 millimeters in Soviet sources, but photographs and other dimensions of the unit suggest that the measurement more likely is 1,200 millimeters.

Function
Double-end tenoning machines are used primarily in the furniture industry to trim and finish two ends of a part simultaneously, cut single or multiple dados at various locations along the part, and perform a variety of specialty operations such as coping, scoring, sanding, and shaping.

Comparability
The US analog, with its more powerful motor and faster feed capability, is a more productive unit than the Soviet. The US machine also can be adapted to perform more complex operations than those performed by the Soviet machine, which helps to explain its greater weight and sturdiness and relatively high price.

Representativeness
This item is more representative of Soviet production. Most US double-end tenoning machines are larger, more powerful, and more versatile than the Soviet model. No more than a half dozen of the US analog was produced annually in the early 1970s. The Soviet model probably was produced in significantly larger quantities in the late 1960s.

Machine Tools
(Woodworking and Sawmill Equipment)

Item Number 78	***Tsennik:***	30 (73); 89
Four-side planing machine	**Rubles:**	7,650
	Dollars:	32,966
	Ruble-Dollar Ratio:	.23

Soviet Model: S10-2

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Size of stock that can be worked (mm)			
Length (minimum)	200	203	102
Width (maximum)	100	102	102
Thickness (maximum	50	102	204
Feed speeds (m/min)	3-30	6.1-48.8	203-163
Number of spindles	5	5	100
Speed of cutting head (rpm)	6,000	6,000	100
Power of electric motors (kW)			
Spindles	16.6	17.54	106
Feed mechanism	1.6	3.73	233
Current transformer	17.5	33	189
Weight (kg)	3,800	4,988	131

Function
Four-side planing machines (called "moulders" in the United States when they are of the size being considered here) are used to make mouldings in a variety of shapes and sizes from previously planed boards.

Comparability
The US analog is the more productive of the two models. The Soviet machine may be conservatively rated with respect to the thickness of the stock that can be worked and, thus, a closer match than the data indicate, but the greater speed at which stock can be fed into the US unit clearly gives it an edge in performance. The higher feed speed of the US analog is a reflection of the more powerful motor controlling that operation. Typically in woodworking machines, the US analog is heavier than its foreign counterpart, which adds to its sturdiness and precision.

Representativeness
This item is more representative of Soviet production. There is not a great demand in the United States for new moulders of this size. They are so durable and expensive that old ones often are rebuilt. Only a few of the US model were produced annually in the early 1970s. The Soviet model probably was produced in significantly larger quantities in the late 1960s.

Machine Tools
(Woodworking and Sawmill Equipment)

Item Number: 79	***Tsennik:***	30 (73); 168
Wood turning lathe	**Rubles:**	903
	Dollars:	4,938
	Ruble-Dollars Ratio:	.18
Soviet Model: TP-40		

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Distance between centers (mm)	1,600	1,524	95
Maximum diameter of stock that can be worked (mm)			
Without work rest			
Over bed	420	406.4	97
In gap of bed	600	No Gap	—
With work rest [1]	250	330	132
Number of spindle speeds	8	8	100
Range of spindle speeds (rpm)	250-2,500	83-3,000	33-120
Power of electric motor (kW)	1.5	2.24	149
Weight (kg)	775	1,269	164

[1] The Soviet model has a simple sliding work rest for the hand-held cutting tool as standard equipment. The work rest that is standard on the US model is an expensive compound crossfeed and swivel tool support post. For this study, a simple work rest of the type on the Soviet model has been substituted for the complex work rest on the US model.

Function
Wood turning lathes of this size are typically used in small-scale or one-of-a-kind operations for making table legs and similar items.

Comparability
The greater range of spindle speeds makes the US analog more versatile than the Soviet model. Without a gap in the bed, the US lathe cannot handle special cases of extrawide stock as the Soviet can, but a gap in the bed on a lathe this small is not considered a very useful feature in the United States. The significantly greater weight and sturdiness of the US analog is typical of US vis-a-vis foreign woodworking machinery.

Representativeness
This item is more representative of Soviet production. The United States no longer makes many lathes of this size. Most US lathes that are functionally similar to the Soviet model are actually much smaller and are used by vocational schools, model makers, and hobbyists. US lathes used to make table legs and similar items generally are much larger and include auxiliary rotary cutters to shape the workpiece. Only a few of the US model were produced annually in the early 1970s. The Soviet model, a workhorse model in the late 1960s, probably was produced in significantly larger numbers.

Machine Tools
(Woodworking and Sawmill Equipment)

Item Number 80	***Tsennik:***	30 (73); 48
Sawmill log frame, single-level	**Rubles:**	7,330
	Dollars:	22,221
	Ruble-Dollar Ratio:	.33

Soviet Model: RK

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Saw gate clearance (mm)	630	584	93
Saw gate stroke (mm)	410	457	111
Diameter of log that can be sawn (mm) [1]	400	406	102
Power of electric motor (kW)	60	45	75
Weight (kg)	6,610	6,803	103

[1] Blades generally are set for logs that are about 150 millimeters less than the maximum width that can be sawn in order to allow for crooked logs and those with branch stubs.

Function
Sawmill log frames (called "sash gang saws" in the United States) are used to saw logs or cants (logs which have been cut flat on two or more sides) into boards. They give a smoother finish to boards than does a circular saw. Because they have thinner blades than circular saws, they also waste less wood (turn less into sawdust) and, therefore, often are used to saw the more expensive hardwoods.

Comparability
Although the Soviet saw has a greater saw gate clearance, it may be rated more conservatively than the US analog with respect to the diameter of logs that can be sawn; a greater allowance may have been made for crooked logs and logs with branch stubs. Automatic adjustment of the angle of approach of the saw blades for different feed speeds is standard on the US saw but not on the Soviet. The cost of this expensive feature, therefore, has been deducted from the price of the US analog. The automatic adjustment optimizes the cutting rate and minimizes the probability of damage caused by inexperienced operators.

Representativeness
This item probably is more representative of Soviet production. Saws of this type have never been as popular in the US as circular saws, apparently because the plentiful supply of timber never imposed a strict requirement to cut down on the amount of a log that goes into sawdust. They have always been more popular in Europe and the European part of the USSR where timber is less plentiful. Less than a half-dozen of all sizes of saws of this type were produced annually in the United States in the early 1970s. Production in the USSR in the late 1960s, though not large, probably exceeded that of the United States.

Machine Tools
(Woodworking and Sawmill Equipment)

Item Number 81	*Tsennik:*	30 (73); 32
Sawmill log frame, two-level	**Rubles:**	15,270
	Dollars:	45,350
	Ruble-Dollar Ratio:	.34

Soviet Model: RD75-6

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Saw gate clearance (mm)	750	812	108
Saw gate stroke (mm)	600	610	102
Diameter of log that can be sawn (mm)[1]	650	610	94
Power of electric motor (kW)	90-100	150	167-150
Weight (kg)	16,800	14,739	88

[1] Blades generally are set for logs that are about 150 millimeters less than the maximum width that can be sawn in order to allow for crooked logs and those with branch stubs.

Function
Sawmill log frames (called "sash gang saws" in the United States) are used to saw logs or cants (logs which have been cut flat on two or more sides) into boards. They give a smoother finish to boards than does a circular saw. Because they have thinner blades than circular saws, they also waste less wood (turn less into sawdust) and, therefore, often are used to saw the more expensive hardwoods.

Comparability
The Soviet saw is a somewhat larger unit than the US analog and can handle logs of greater diameter. The more powerful motor on the US model would, however, permit faster rates and give it an edge in performance in sawing those logs up to 610 millimeters in diameter. Automatic adjustment of the angle of approach of the saw blades for different feed speeds is standard on the US saw but not on the Soviet saw. The cost of this expensive feature, therefore, has been deducted from the price of the US analog. The automatic adjustment optimizes the cutting rate and minimizes the probability of damage caused by inexperienced operators.

Representativeness
This item probably is more representative of Soviet production. Saws of this type have never been as popular in the United States as circular saws, apparently because the plentiful supply of timber never imposed a strict requirement to cut down on the amount of a log that goes into sawdust. They have always been more popular in Europe and the European part of the USSR where timber is less plentiful. Less than a half-dozen of all sizes of saws of this type were produced annually in the United States in the early 1970s. Production in the USSR in the late 1960s, though not large, probably exceeded that of the United States.

Forging-Pressing Machinery and Equipment

Item Number 82	***Tsennik:***	12 (72); p.20
Mechanical OBI single-action press	**Rubles:**	7,230
	Dollars:	21,534
	Ruble-Dollar Ratio:	.34

Soviet Model: KA-2330

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rated capacity (tons)	100	99	99
Stroke of slide (mm)	130	152	117
Slide strokes per minute	80	85	106
Size of bed (mm)			
Left to right	850	1,067	126
Front to back	560	686	122
Power of the main drive (kW)	10	7.5	75
Weight (kg)	9,000	12,684	141

Function
Open-back inclinable (OBI) presses are used for stamping out a variety of small parts such as brackets and hinges. Single action means that the machine has only one moving slide acting against a fixed bed.

Comparability
The Soviet and US presses have virtually the same rated capacity. The US analog, however, has more slide strokes per minute and in continuous operation would be more productive. In addition, the larger table of the US analog enables it to use larger dies and to produce slightly larger parts. Because of its larger table, the US analog is substantially heavier. Although the Soviet model is limited to smaller parts, it may accept heavier gauge metal because of the smaller table size and greater horsepower.

Representativeness
This item probably is more representative of US production. OBI presses represented by these particular models are produced in small quantities in both countries, probably on the order of 20 to 25 annually. However, total US production of OBI presses probably is greater than that of the USSR because of a preference in the United States for stamping parts from sheet metal.

Forging-Pressing Machinery and Equipment

Item Number 83	***Tsennik:***	12 (72); p.20
Open-back inclinable punch press	**Rubles:**	2,030
	Dollars:	12,707
	Ruble-Dollar Ratio:	.16

Soviet Model: KB-2324

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rated capacity (tons)	25	29	116
Strokes per minute	120	130	108
Size of bed (mm)			
Left to right	500	533	107
Front to back	340	355	104
Power of the main drive (kW)	3.75	3.0	80
Weight (kg)	2,250	2,950	131

Function
Open-back inclinable (OBI) punch presses are used primarily to punch holes in sheet metal.

Comparability
The US analog has a higher rated capacity, a larger bed, and more weight and rigidity. In continuous operation, the US analog, with 8 percent more slide strokes per minute, would be slightly more productive than the Soviet press. The difference in the power to the main drive is not significant since US motors tend to be rated conservatively.

Representativeness
This item is representative of production in both countries, production of OBI presses being rather high in each case. The US model is batch produced. The Soviet model may be serially produced.

Forging-Pressing Machinery and Equipment

Item Number 84	***Tsennik:***	12 (72); p.24
Straight-sided mechanical press	**Rubles:**	26,220
	Dollars:	65,833
	Ruble-Dollar Ratio:	.40

Soviet Model: K2535

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rated capacity (tons)[1]	315	270	86
Standard stroke of slide (mm)	200	203	102
Slide strokes per minute	32	32	100
Size of bed (mm)			
Left to right	1,000	914	91
Front to back	1,000	1,067	107
Power of the main drive (kW)	40	37	92
Weight (kg)	30,000	37,146	124

[1] A measure of the pressure generated at or near the bottom of the slide stroke.

Function
Straight-sided mechanical presses of 200 to 800-ton capacity stamp out a wide variety of parts from thin sheet metal. They are used for parts that are produced in high volume, such as parts for consumer goods.

Comparability
The US analog has a smaller rated capacity and a slightly smaller bed, but the differences are not significant.

Representativeness
This item is more representative of US production. Presses of this type are more common in the United States because of its relatively larger consumer goods sector. Few of them were produced in the USSR in 1967. In the United States they are batch produced.

Forging-Pressing Machinery and Equipment

Item Number 85	*Tsennik:*	12 (72); p.26
Straight-sided mechanical press	**Rubles:**	146,850
	Dollars:	373,928
	Ruble-Dollar Ratio:	.39

Soviet Model: K665

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rated capacity (tons)	800	720	90
Maximum stroke of slide (mm)	800	800	100
Slide strokes per minute	15	15	100
Size of bed (mm)			
Left to right	4,200	3,962	94
Front to back	2,000	1,981	99
Power of the main drive (kW)	100	75	75
Weight (kg)	205,000	111,000	54

Function
Straight-sided mechanical presses in the 800-ton range stamp a wide variety of parts from sheet metal. They are widely used by the automotive and truck industries.

Comparability
The US analog has a 10 percent smaller rated capacity and a smaller bed, but the differences are not significant. Since US motors are conservatively rated, the power actually available to the main drive probably is much closer to the Soviet specification than is indicated. The Soviet model is much heavier but may not have a corresponding advantage in rigidity. The US analog is more modern, reflecting construction design that is intended to increase rigidity while reducing weight.

Representativeness
This item is more representative of US production, although straight-sided mechanical presses are widely used by industry in both countries. However, the United States probably produces more presses of this type since automotive production is considerably greater in the United States than in the USSR. This particular US model is batch produced. The Soviet model is serially produced.

Forging-Pressing Machinery and Equipment

Item Number 86	***Tsennik:***	12 (72); p.38
Hydraulic forming press, four-column	**Rubles:**	240,350
	Dollars:	329,908
	Ruble-Dollar Ratio:	.73

Soviet Model: P156

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rated capacity (tons)	2,000	1,800	90
Maximum stroke of slide (mm)	1,600	1,600	100
Working strokes per minute	10	10	100
Size of bed (mm)			
Left to right	2,000	4,000	200
Front to back	4,000	2,000	50
Weight (kg)	300,000	203,850	68

Function
Hydraulic forming presses are used to form parts out of heavy sheet metal or light plate.

Comparability
The US analog has a 10 percent smaller rated capacity, but the difference is not significant. Despite the difference in weight, the US press probably has comparable rigidity. The US press is more modern and reflects a construction that is designed to reduce the weight and to maintain the rigidity in large presses.

Representativeness
This item is representative of production in both countries and produced in small quantities in both countries.

Forging-Pressing Machinery and Equipment

Item Number 87	***Tsennik:***	12 (72); p. 80
Pneumatic power forging hammer	**Rubles:**	6,430
	Dollars:	28,416
	Ruble-Dollar Ration:	.23

Soviet Model: M415A

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Nominal falling weight (kg)	400	340	85
Maximum stroke of ram (mm)	700	685	98
Blows per minute	130	115	88
Power of the main drive (kW)	28	29.8	106
Weight without anvil (kg)	8,700	9,989	115

Function
Forging hammers are used in low volume production to forge small parts such as gear blanks.

Comparability
The Soviet model may be more productive than the US analog, since it has a 15 percent larger falling weight, a slightly longer stroke, and is capable of more blows per minute. The US analog has more power and weight, but the differences probably are not significant.

Representativeness
This item is more representative of Soviet production. The US analog is produced on order. The Soviet model probably is serially produced and in larger quantities than in the United States.

Forging-Pressing Machinery and Equipment

Item Number 88	***Tsennik:***	12 (72); p. 90
Eccentric shears	**Rubles:**	6,420
	Dollars:	15,641
	Ruble-Dollar Ratio:	.41

Soviet Model: N3221

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum size of sheet cut (mm)			
Thickness	12.5	12.7	102
Width	2,000	1,930	96
Knife strokes per minute	30	30	100
Power of the main drive (kW)	14	29.8	213
Weight (kg)	9,000	10,000	111

Function
Eccentric shears are used to cut sheet metal. They can be actuated mechanically, hydraulically, or pneumatically.

Comparability
Both models cut virtually the same sized sheets. Both have the same speed. The US analog is more than twice as powerful because it is hydraulically driven; hydraulic units require substantially more power to operate than mechnical units.

Representativeness
This item is representative of production in both countries.

Forging-Pressing Machinery and Equipment

Item Number 89	*Tsennik:*	12 (72); p. 59
Double stroke solid die cold header	**Rubles:**	3,860
	Dollars:	40,740
	Ruble-Dollar Ratio:	.09

Soviet Model: AA129

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum diameter of wire (mm)	8	8	100
Maximum length of wire (mm)	65	66	102
Strokes per minute	180	350	194
Parts per minute	90	175	194
Power of the main drive (kW)	7	7.5	107
Weight (kg)	2,700	5,210	193

Function
Heading machines cut wire from a coil and form the resulting blanks into parts such as nails, bolts, and rivets.

Comparability
The diameter and length of wire that can be handled, as well as the power of the main drive, are closely comparable. However, strokes per minute, the key measure of productivity, is nearly twice as large for the US analog as for the Soviet model. The US analog weighs nearly twice as much as the Soviet model, probably to provide the additional rigidity needed to support the higher production rates.

Representativeness
This item is representative of production in both countries. The US model is produced in small batches. The Soviet model may also be batch produced.

Casting Machinery and Equipment

Item Number 90	***Tsennik:***	13 (72); 256
Core blower	**Rubles:**	3,696
	Dollars:	13,480
	Ruble-Dollar Ratio:	.27

Soviet Model: S-216

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum weight of core made (kg)	10	Similar	100
Productivity (cycles/hr)	150-200	Similar	100
Maximum size of core boxes (mm)			
Length	550	533	97
Height	325	337	104
Horizontal and vertical core box joints	Yes	Yes	—
Travel of table (mm)	255	Similar	100
Operating pressure (kg/cm ^{2})	7	8.4	120

Function
Core blowers of this type are used in foundries to make sand cores for incorporation into sand molds. Cores are placed in the mold in order to provide cavities in the casting.

Comparability
With its higher operating pressure, the US analog should be able to produce a harder and better quality core. In actual use, the US analog probably would be fitted with a roller table which would improve its productivity.

Representativeness
The representativeness of this item cannot be judged. The United States probably made less than two dozen annually in the early 1970s. The number produced in the USSR in the late 1960s is unknown.

Casting Machinery and Equipment

Item Number 91	*Tsennik:*	13 (72); 447
Pressure die-casting machine	**Rubles:**	6,174
	Dollars:	29,870
	Ruble-Dollar Ratio:	.21

Soviet Model: 515

Specifications:	USSR	US	Difference (US as percent of USSR)
Productivity (cycles/hr)	120	NA	—
Molding chamber of the cold horizontal type	Yes	Yes	—
Locking mechanism of the lever type	Yes	Yes	—
Maximum pressure (tons)			
Locking	130	136	105
Injection	13	5.5	42
Maximum weight of poured alloy (kg)			
Aluminum	1.6	1.4	88
Zinc	5.5	3.6	65
Power of electric motor (kW)	14	11.2	80

Function

Die-casting machines are used to make castings of aluminum, magnesium, zinc, lead, copper, and their alloys when a minimum of trimming is desired and when the number of parts required is large or the parts are to be made over a long production run.

Comparability

The Soviet model is the more productive of the two. Productivity, however, is reflected not only in the size of the parts that can be produced but also in the number of casts per hour. The latter information is not given for the US analog because the manufacturer stated that for this type of machine productivity is as much a function of the skill of the operator as of the machine's characteristics. Assuming that the operating cycle of the US machine is equal to that of the Soviet, the Soviet machine would still be about one-third more productive in total weight of castings made because it makes larger parts. The capability of the Soviet machine to make larger parts is directly related to its larger electric motor.

Representativeness

The representativeness of this item cannot be judged. The value of all die-casting machines produced in the United States in 1972 (no unit figure is available) was only about two-thirds of the value of those produced in 1967, when about 380 units were made. The number produced in the USSR in the late 1960s is unknown.

Tools and Dies

Items Number 92	*Tsennik:*	30 (73); 4
Chain saw, electric	**Rubles:**	28
	Dollars:	49
	Ruble-Dollar Ratio:	.57

Soviet Model: EP-K6

Specifications:	USSR	US	Difference (US as percent of USSR)
Chain speed (m/sec)	7.3	12.42	170
Length of cut (cm)	40	35.56	89
Power of electric motor (kW)	1.7	1.5	88
Weight (kg)	9.5	4.3	45

Function
Electric chain saws are used to fell trees in forestry operations using portable engine-driven generators or by homeowners for tree care on small properties or for cutting of firewood. Several saws can be plugged in to one portable generator.

Comparability
The US analog is the more productive of the two saws, both because its faster chain speed permits faster cutting and because its much lighter weight would be less tiring for the operator.

Representativeness
This item is more representative of Soviet production. Electric models enjoy a certain popularity among homeowners in the United States because they are cheaper than gasoline-powered models, but the requirement for a handy place to plug in is a major restriction on their use. They are far more popular, however, in the USSR than in the United States in commercial forestry.

Precision Instruments
(Computers)

Item Number 93	***Tsennik:***	17 (73); 16
Digital computer	**Rubles:**	1,275,690
	Dollars:	996,438
	Ruble-Dollar Ration:	1.28

Soviet Model: BESM-6

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Speed (operations/sec)	500,000	NA [1]	—
Memory size (000 bits)	32	32	100
Memory cycle time (microsec)[2]	2	1	50
Magnetic drum capacity (000 characters)	2,100	4,100	195
Card reader speed (cards/min)	600	1,200	200
Card punch speed (cards/min)	100	250	250
Printer speed (lines/min)	400	1,200	300

[1] Equivalent or greater. US manufacturers typically do not provide this measure for their computers, since the operating speed depends entirely upon the particular problem being carried out and can vary widely.
[2] The lower the numerical value of the specification, the greater the capability.

Function
This item is a large digital computer designed for scientific/engineering calculations.

Comparability
Some BESM-6 execution speeds (for example, addition) are faster than those of the US machine. However, the US analog has a much faster memory, a significantly greater magnetic drum capacity, and a much faster printer. Hence, the US analog has a superior performance overall.

Representativeness
This item is more representative of Soviet production even though the BESM-6 is a hand-made machine produced in very small numbers. The US model is built in larger quantities than the BESM-6, but is only a small fraction of US output. The US model is highly unrepresentative of US production in 1972. A more normal configuration in the US would include magnetic discs for external data storage.

Precision Instruments
(Computers)

Item Number 94	*Tsennik:*	17 (73); 412
Line printer	**Rubles:**	11,330
	Dollars:	25,915
	Rubles-Dollar Ratio:	.44

Soviet Model: ATsPU-128-3M

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Speed (lines/min)	400	300	75
Characters per line [1]	128	136	106

[1] Letter or number

Function
Line printers are devices that print out information from the computer. A complete line of print is produced at one time.

Comparability
The US analog is slower than the Soviet model.

Representativeness
This item is more representative of Soviet production. The Soviet printer was produced in very large numbers and utilized on most of the Soviet computer models during the late 1960s. The US printer, although not produced in large numbers, is typical of the type of printers used with small computers in 1972. However, most printers produced in the United States had far greater speeds.

Precision Instruments

Item Number 95	***Tsennik:***	25 (73); 121
Electron microscope	**Rubles:**	25,540
	Dollars:	49,793
	Ruble-Dollar Ration:	.51

Soviet Model: UEMV-100K

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Resolving power [1] (angstroms)[2]	7	5	71
Magnification (times)	200,000	200,000	100
Specimen size, diameter (mm)	3	3	100

[1] The ability to distinguish two objects in close proximity as separate objects.
[2] The lower the numerical value of the specification, the greater the capability.

Function
Electron microscopes are used to provide visible images of extremely small items.

Comparability
The US analog provides superior performance. Although both the Soviet and US items accept the same sized specimen and can magnify a specimen to the same maximum degree, the US analog has greater resolving power. Thus, for a given level of magnification, the US analog will permit the observer to see an object with greater clarity than the Soviet model.

Representativeness
This item is more representative of Soviet production. The US model is only available on special order. Most electron microscopes used in the United States are imported from Japan or the Netherlands.

Precision Instruments

Item Number 96	***Tsennik:***	25 (73); 211
Autocollimator	**Rubles:**	970
	Dollars:	2,715
	Ruble-Dollar Ration:	.36

Soviet Model: AK-0.25

Specifications:	**USSR**	**US**	**Difference (US as Percent of USSR)**
Scale division (seconds of arc)			
Fine scale [1]	0.25	0.1	40
Coarse scale [1]	15.0	1.0	7
Measurement range (minutes of arc)	6	10	167

[1] The lower the numerical value of the specification, the better the quality.

Function
Autocollimators are precision optical instruments designed to detect or measure small angular displacements. A common use is measuring the straightness and alignment of machined surfaces.

Comparability
The US analog has far greater measurement range than the Soviet model. Within this range, the US unit also has a more closely spaced scale which permits significantly more accurate measurements.

Representativeness
This item is representative of production in both countries.

Precision Instruments

Item Number 97	***Tsennik:***	25 (73); 55
Infrared microscope	**Rubles:**	1,100
	Dollars:	4,862
	Ruble-Dollar Ratio:	.23

Soviet Model: MIK-1

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Single-stage	Single-stage	—
Resolution (microns) [1]			
Total system	NA	1.0	—
Optical subsystem [2]	0.74 [3]	0.56 [3]	76
Magnification (number of times)			
Total system	600	600	100
Visual with transmitted light	460	200	43
Wavelengths (microns)	0.8-1.3	0.8-1.2	100-92

[1] A measure of the detail which can be observed in an image. The poorer the resolution, the more blurred and distorted the image.
[2] The lower the numerical value of the specification, the better the resolution.
[3] Computed.

Function

Infrared microscopes of this type are similar in design to conventional optical microscopes but operate in a region of the electromagnetic spectrum that the human eye cannot detect. They are used to make visible and magnify an infrared image of an object. They operate by converting the infrared image into an optical image, with an image converter, and magnifying the optical image with an optical microscope. A common use is to identify the location of localized hot spots in semiconductor devices.

Comparability

Both models operate on the same wavelengths and have the same degree of magnification for the total system. However, a corresponding parameter on total system resolution for the Soviet model, which is needed to make the specification on magnification meaningful, is missing. High magnification is of little value if the image is badly distorted. It has been possible to compute the resolution for the optical subsystem, and the US analog is seen to have a significantly greater capability.

Representativeness

This item is representative of production in both countries, although probably produced in small quantities in each case. Infrared microscopes of this type are used in both countries for research and development in semiconductor industries.

Precision Instruments

Item Number 98	***Tsennik:***	48 (73); 60
Electromechanical wind recorder	**Rubles:**	571
	Dollars:	815
	Ruble-Dollar Ratio:	.70

Soviet Model: M-12

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Velocity measurement range (m/sec)	1-40	1-44.7	100-112
Velocity accuracy (m/sec)[1]	±0.5	±0.22	44
Direction measurement range (°)	0-360	0-360	100
Direction accuracy (°)[1]	±11.25	±3.6	32
Time of drum revolution (hours)	26	744	2,862

[1] The lower the numerical value of the specification, the better the quality.

Function
Wind recorders are used to record wind velocity and direction.

Comparability
The ranges of wind velocity and direction measured by the two units are comparable. The accuracy of the US analog is superior for both types of measurements. A major difference is in the length of the recording period: the Soviet unit provides a record for one day only; the US analog operates for one month.

Representativeness
This item is representative of production in both countries. They are widely used by weather bureaus. The Soviet model is equivalent to US models produced in the 1950s.

Precision Instruments

Item Number 99	*Tsennik:*	48 (73); 13
Aneroid barometer	**Rubles:**	53
	Dollars:	388
	Ruble-Dollar Ratio:	.14

Soviet Model: MD-49-2

Specifications:	USSR	US	Difference (US as percent of USSR)
Measurement range (mm mercury)	610-790	579.6-787.4	95-100
Accuracy (mm mercury) [1]	±0.8	±0.23	29

[1] The lower the numerical value of the specification, the better the quality.

Function
Aneroid barometers are used for measuring atmospheric pressure. They can be used for checking meterological instruments or altimeters.

Comparability
The Soviet and US items have a similar range of measurement. The US analog is substantially more accurate.

Representativeness
This item is representative of production in both countries.

Precision Instruments

Item Number 100	***Tsennik:***	48 (73); 73
Electric thermometer	**Rubles:**	60
	Dollars:	389
	Ruble-Dollar Ratio:	.15

Soviet Model: AM-2M

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Measurement range (°C)	−30 to 45	−30 to 50	107
Error (°C) [1]	±1	±0.5	50
Number of Sensors	10	10	100

[1] The lower the numerical value of the specification, the better the quality.

Function
Thermometers of this type are used for measuring soil temperature and, thus, are widely used in agricultural applications. They employ 10 temperature sensors which are cable-connected to an indicator unit.

Comparability
Each unit employs the same number of sensors and operates over about the same temperature range. The US analog gives measurements that are twice as accurate as the Soviet model.

Representativeness
This item is representative of production in both countries.

Precision Instruments

Item Number 101	***Tsennik:***	45 (73); 1260
Milliammeter	**Rubles:**	56
	Dollars:	476
	Ruble-Dollar Ratio:	.12

Soviet Model: D258

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Range (milliamperes)	1-2; 5-10; 25-50; 50-100	1-5; 2-10; 10-50; 20-100; 100-500	—
Accuracy (percent)	0.5	0.5	100
Scale length (mm)	17	16	94
Frequency	DC and 50 Hz	AC	—

Function
Milliammeters are used for low level electrical current measurements.

Comparability
The Soviet unit does not operate continuously over its range of 1 to 100 milliamperes. Apparently, it cannot measure between 2 and 5 or between 10 and 25 milliamperes. This deficiency would seriously limit its usefulness. The US analog operates continuously and over a wider range of currents. On the other hand, the ratio between the highest and lowest current on each scale is 2:1 for the Soviet unit and 5:1 for the US unit. Since scale length is about the same, it would appear that the Soviet model can be read with greater precision. Finally, the two units are based on different principles of operation. The Soviet model uses an electrodynamic technique which protects against overloads and improves mechanical ruggedness. The US model uses a thermal technique which provides the capability for operation at higher frequencies.

Representativeness
This item is more representative of US production. The US analog is a general-purpose device. The discontinuous measurement range of the Soviet model suggests that it may be a special design for a specific end use.

Precision Instruments

Item Number 102	*Tsennik:*	45 (73); 1448
Frequency meter	**Rubles:**	152
	Dollars:	800
	Ruble-Dollar Ratio:	.19

Soviet Model: N345

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Frequency range (Hz)	49-51	—	—
	48-52	—	—
	45-55	45-55	100
Accuracy for 45 to 55 Hz (percent) [1]	±2.5	±2	80
Change in reading caused by 400 amperes/meter Magnetic field (percent)			
Unshielded	±2.5	None	—
Shielded	±0.5	None	—
Change in reading per 10 °C (percent)	2.5	None	—

[1] The lower the numerical value of the specification, the better the quality.

Function
These meters are used to generate a chart showing variations in powerline frequency over time. They are used extensively in industrial and electric power generating facilities.

Comparability
Both units operate over the same frequency range with about the same accuracy. The Soviet unit has the added capability of being able to expand the 48 to 52 Hz and 49 to 51 Hz subranges to full scale, which permits greater precision of reading. In contrast to the Soviet unit, the US analog is unaffected by changes in temperature or the presence of a magnetic field.

Representativeness
This item is representative of production in both countries.

Precision Instruments

Item Number 103	*Tsennik:*	45 (73); 1484
Luxmeter	**Rubles:**	315
	Dollars:	482
	Ruble-Dollar Ratio:	.65

Soviet Model: Yu17

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Range (lux)	1, 10, 100	1, 10, 100, 1000	1,000 [1]
Accuracy (percent) [2]	10	2	20

[1] At maximum range.
[2] The lower the numerical value of the specification, the greater the capability.

Function
Luxmeters are used to measure low-level light intensity.

Comparability
Both models use photosensitive detectors which generate a voltage proportional to the intensity of the light falling on them. The greater range and better accuracy of the US analog are due to its silicon detectors. The Soviet model uses selenium detectors.

Representativeness
This item is representative of production in both countries.

Precision Instruments

Item Number 104	***Tsennik:***	47 (73); 26
Vectorelectrocardioscope	**Rubles:**	858
	Dollars:	3,038
	Ruble-Dollar Ratio:	.28

Soviet Model: VEKS-4

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Sensitivity (mm/mv)	20	100	500
Horizontal sweep rate (mm/sec)			
Minimum/maximum	25/100	25/1,000	100/1,000
Range	75	975	1,300
Frequency response (Hz) [1]	AC-1,000	AC-1,000	100
Channels	3	4 [1]	133

[1] A fourth channel is used to display the heart sound signal.

Function

These units are used to provide visual displays representing the voltages generated by heart muscles. They are used in research, diagnosis, and intensive care applications.

Comparability

The US analog is much more sensitive, permitting display of weaker signals. The sweep rate is much faster, allowing detailed examination of phenomena of short duration. The US unit also has many additional features, not listed above, for manipulation of the data into other useful formats. It also has a fourth channel to display a heart sound signal.

Representativeness

This item is more representative of Soviet production. In the United States, manufacturers often combine several other functions within an electrocardioscope or produce an instrument capable of monitoring several patients at one time.

Precision Instruments

Item Number 105	***Tsennik:***	45 (73); 1163
Volt-ohm meter	**Rubles:**	259
	Dollars:	325
	Ruble-Dollar Ratio:	.80

Soviet Model: VK7-9

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
DC voltage measurement: voltages (volts)	0.3-1,000	.0015-1,500	—
Range (approximate, in volts)	1,000	1,500	150
Subranges (number)	8	17	212
Accuracy (percent)	±2.5	±1.5	60 [1]
AC voltage measurement: voltages (volts)	1-1,000	.0015-1,500	—
Range (approximate, in volts)	1,000	1,500	150
Subranges (number)	7	17	243
Accuracy (percent) [2]	See below	See below	—
Maximum frequency (MHz)	700	1,000	143
Resistance:			
Range (ohms)	10^2-10^9	10^3-10^{10}	1,000
Subranges (number)	7	4	57
Accuracy (percent)	±2.5-4	±1.5	[3]
Maximum temperature variation for rated accuracy (°C)	10	35	350

[1] The lower the numerical value of the specification, the better the quality.
[2] Accuracy varies in a complex way depending upon the level of voltage and the frequency. In each case the US analog is more accurate.
[3] The accuracy of the Soviet unit varies with subrange.

Function

The Soviet unit is a general-purpose electronic instrument for measuring AC and DC voltage as well as electrical resistance (ohms). The US unit has these capabilities and also can measure AC and DC current, the ratio between two voltages, and the difference between two voltages.

Comparability

The US instrument is capable of measuring all parameters covered by the Soviet unit and with better accuracy. The measurement ranges and frequency rating of the US analog exceed those of the Soviet model. The US model can make additional types of measurements and is less affected by temperature variations.

Representativeness

This item is more representative of US production. The US analog is a fairly modern design, while the Soviet model is outmoded.

Precision Instruments

Item Number 106	*Tsennik:*	45 (73); 908
Oscillator	**Rubles:**	286
	Dollars:	578
	Ruble-Dollar Ratio:	.49

Soviet Model: G3-33

Specifications:	USSR	US	Difference (US as percent of USSR)
Output	Sine Wave	Sine Wave	—
Output power	0.5	2.5	500
Frequencies (KHz)	0.02-200	0.005-500	25-250
Range (approximate)	200	500	250
Frequency drift (percent) [1]	0.0015	0.0005	33
Harmonic distortion (percent)			
Below 5 KHz [1]	0.3	0.1	33
Above 5 KHz [1]	0.7-3 [2]	0.3	43-10
Weight (kg)	30	6.35	21

[1] The lower the numerical value of the specification, the better the quality.
[2] Distortion of the Soviet unit varies with frequency.

Function
These oscillators are variable frequency sources of electrical signals. They are used to generate test signals in the design, repair, and maintenance of electronic equipment.

Comparability
The US analog is superior to the Soviet model in all performance parameters. In the range of frequencies, the most important performance characteristic, the analog is superior by a factor of more than two. The frequency drift of the US model is lower, giving a more stable signal, and the generated signal is much freer of distortion.

Representativeness
This item is representative of production in both countries.

Precision Instruments

Item Number 107	***Tsennik:***	45 (73); 1631
Oscilloscope	**Rubles:**	1,030
	Dollars:	1,275
	Ruble-Dollar Ratio:	.81

Soviet Model: S1-49

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Bandwidth (MHz)	DC-5	DC-6	120
Sensitivity (mw/cm)[1] [2]	16.6	15.75	95
Maximum sweep rate (microsec/cm) [2]	66	0.79	1

[1] Ability to detect a weak signal.
[2] The lower the numerical value of the specification, the greater the capability.

Function
Oscilloscopes are used to provide a visual display of the variation in an electrical signal as a function of time.

Comparability
The difference in bandwidth of the US and Soviet units is minor from a functional point of view. Sensitivity is about the same for both models. The US analog is considerably superior in terms of maximum sweep rate, which would give it a better capability to analyze events of short duration.

Representativeness
This item is more representative of Soviet production. Production of oscilloscopes in the United States is more heavily weighted toward models with much wider bandwidths.

Precision Instruments

Item Number 108	*Tsennik:*	45 (73); 1389
Frequency meter	**Rubles:**	391
	Dollars:	990
	Ruble-Dollar Ratio:	.39

Soviet Model: Ch2-37

Specifications:	USSR	US	Difference (US as percent of USSR)
Frequencies (MHz)	7.7-10.7	8.2-11.0	106-103
Range	3.0	2.8	93
Error (percent)[1]	0.05	0.01	20

[1] The lower the numerical value of the specification, the greater the capability.

Function
Frequency meters of this type are used for checking and calibrating frequencies of standard signal generators and other microwave electronic equipment.

Comparability
The US and Soviet units operate over a similar frequency range. However, the US analog is five times more accurate than the Soviet model. The Soviet item has a capability for measuring power which the US item lacks. US designers do not combine frequency and power measurements in the same design, apparently due to a difference in design philosophy.

Representativeness
This item is representative of production in both countries.

Precision Instruments

Item Number 109	*Tsennik:*	45 (73); 1350
Power meter	**Rubles:**	726
	Dollars:	1,484
	Ruble-Dollar Ratio:	.49

Soviet Model: M3-10

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Frequency range (MHz)			
Coaxial input [1]	0.15-5.6	0.01-10	7-179
Range	5.45	9.99	183
Waveguide Input [1]	5.6-16.7	5.3-18	95-108
Range	11.1	12.7	114
Power (mw)	0.15-7.5	0.1-10	67-133
Range	7.35	9.9	135
Accuracy (percent) [2]	10	1	10

[1] High frequency electrical signals normally are transmitted from point to point in electronic equipment either through coaxial cables or waveguides. Coaxial cable is two-conductor cable in which one conductor is in the form of a cylinder surrounding the second central conductor. A waveguide consists of a hollow metallic tube. To be of general use, test equipment operating at such high frequencies must be able to make connections both to coaxial cables and to waveguides.
[2] The lower the numerical value of the specification, the greater the capability.

Function

These meters are used for the measurement of electrical power over a wide range of frequencies. They use a variety of sensing units, each with its own frequency characteristic and type of input (coaxial or waveguide) which are connected to an indicating unit.

Comparability

The two units are similar in frequency range for waveguide input as well as power measuring capability. The US analog is 10 times more accurate and has nearly twice the frequency range for coaxial input.

Representativeness

This item is representative of production in both countries.

Mining and Metallurgical Machinery and Equipment
(Oil Industry Machinery and Equipment)

Item Number 110	***Tsennik:***	32 (72); 438
Oil drilling rig	**Rubles:**	243,123
	Dollars:	686,648
	Ruble-Dollar Ratio:	.35

Soviet Model: BU-80BrD

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Method of drilling	Rotary	Rotary	—
Maximum drilling depth with 115-mm pipe (m)	2,800	3,658	131
Maximum hook load (tons)	140	181	129
Main drive capacity (kW)	1,000	1,045	104
Diameter of rotary table opening (mm)	560	571	102
Slush pumps:			
Number	2	2	100
Hydraulic capacity (kW)	332	369	111
Maximum swivel load capacity (tons)	160	181	113
Maximum traveling block capacity (tons)	140	181	129
Maximum rotary hook capacity (tons)	140	136	97
Maximum crown block capacity (tons)	185	181	98
Power of diesel-generator units (kW)	200	200	100
Weight (tons)	258	221	86

Function
Oil drilling rigs of this size are used for drilling exploratory and development oil wells to a depth of approximately 3 kilometers.

Comparability
The Soviet and US rigs are fairly comparable, although the US analog, despite its 14 percent lighter weight, can drill to a greater depth and can lift a higher weight of drill string. The greater Soviet weight is typical of Soviet rigs in which structural components and pumps are generally more massive than those produced in the United States.

Representativeness
The representativeness of this item is uncertain. The Soviet model is a standard workhorse unit among four or five designed to drill to depths of about 3,000 meters. Several hundred complete exploratory and development drilling rigs are manufactured annually. Probably no more than 50 of this particular model are produced each year. US rigs generally are custom built to the purchaser's order from a collection of standard components.

Mining and Metallurgical Machinery and Equipment
(Oil Industry Machinery and Equipment)

Item Number 111	*Tsennik:*	32 (72); 448
Oil drilling rig	**Rubles:**	263,383
	Dollars:	823,525
	Ruble-Dollar Ratio:	.32

Soviet Model: Uralmash-125BD

Specifications:	USSR	US	Difference (US as percent of USSR)
Method of drilling	Rotary	Rotary	—
Maximum drilling depth with 115-mm pipe (mm)	4,000	4,000	100
Maximum hook load (tons)	160	272	170
Main drive capacity (kW)	1,680	1,740	104
Diameter of rotary table opening (mm)	520	522	100
Slush pumps:			
Number	2	2	100
Hydraulic capacity (kW)	373	504	135
Maximum swivel load capacity (tons)	160	272	170
Maximum traveling block capacity (tons)	125	272	218
Maximum crown block capacity (tons)	125	272	218
Power of diesel-generator units (kW)	200	200	100
Weight (tons)	334	252	75

Function
Oil drilling rigs of this size are used for drilling exploratory and development oil wells to a depth of approximately 4 kilometers.

Comparability
The Soviet and US rigs appear to be similar in performance. The US analog is about 25 percent lighter than the Soviet model but can handle greater weights of drill string. The greater Soviet weight is typical of Soviet rigs in which structural components and pumps are generally more massive than those produced in the United States.

Representativeness
The representativeness of this item is uncertain. The Soviet model is one of four standard rigs designed to drill to depths of 4,000 meters. No published data are available on the annual output. Probably no more than 10 to 20 were manufactured annually in the late 1960s. US rigs generally are custom built to the purchaser's order from a collection of standard components.

Mining and Metallurgical Machinery and Equipment
(Oil Industry Machinery and Equipment)

Item Number 112	***Tsennik:***	34 (72); 2
Absorber	**Rubles:**	48,050
	Dollars:	226,046
	Ruble-Dollar Ratio:	.21

Soviet Model: 172310

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Diameter (mm)	2,800	2,800	100
Height (m)	23	23	100
Pressure (kg/cm^3)	40	40	100
Number of trays	10-15	10-15	100
Weight (tons)	81	100	123

Function
Absorbers are used in refineries to obtain petroleum derivatives. Heated petroleum vapors rise to the top of the absorber, passing through the trays. As the vapors cool, different petroleum derivatives condense out at different levels and collect in the trays.

Comparability
The US analog has been matched to Soviet performance specifications by a US manufacturer. The specifications are quite limited, however, and operating requirements may differ widely depending upon the use. The lower weight of the Soviet absorber is in contrast to normally bulkier and heavier Soviet refining equipment. In this particular case, the Soviet model apparently is made of carbon steel which is lighter but less durable than the stainless steel normally used for vessels of this type in the United States.

Representativeness
The representativeness of this item is uncertain. The Soviet model is one of 12 for specialized natural gasoline plants for which a price was available. Standardization in production in the USSR seems likely, however, whereas US units are custom built for specific applications.

Mining and Metallurgical Machinery and Equipment
(Mining Machinery and Equipment)

Item Number 113	*Tsennik:*	36 (72); 250
Heading combine, shear-table, single rotor	**Rubles:**	167,850
	Dollars:	402,173
	Ruble-Dollar Ratio:	.42

Soviet Model PK-8

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Mining rate in salt (tons/hr)	150	Similar	100
Dimension of work cross section (m^2)	8-9	8.3-10	104-111
Working speed (m/hr)	12	Similar	100
Power of electric motors (kW)	505	560	111
Weight (tons)	61.5 [2]	67.1	109

[1] US analog has a double rotor.
[2] Includes a set of spare parts.

Function
Heading combines of this size (called "boring-type continuous miners" in the United States) typically are used for mining salt and potash or in coal mines for tunneling in low-abrasive materials.

Comparability
The two models are similar in performance. The double-rotor US analog simply provides a differently shaped tunnel cross section compared with the Soviet model. It probably also accounts for the analog's greater weight and, hence, the need for more powerful electric motors.

Representativeness
This item probably is more representative of Soviet production. This type of miner, although in use in salt and potash mines and in tunneling in coal mines in the United States, is no longer very popular, having been supplanted in large measure by rotary, drum-type miners. Only a few were made annually in the United States in the early 1970s. Soviet production in the late 1960s is unknown but is believed to have been larger than that of the United States.

Mining and Metallurgical Machinery and Equipment
(Mining Machinery and Equipment)

Item Number 114	***Tsennik:***	36 (72); 326
Loader, gathering-arm type, continuous action	**Rubles:**	61,200
	Dollars:	69,456
	Ruble-Dollar Ratio:	.88

Soviet Model: PNB-3K

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Productivity (m^3/min)	3	8.5	283
Gathering width (m)	2	2.36	118
Travel speed (m/min)	10.9	30.5	280
Conveyor speed (m/sec)	1	1.78	178
Power of electric motors (kW)	88	95	108
Weight (tons)	21.8	12.1	56

Function
Loaders of this type are used in underground mining to pick up loose coal and/or rock and transfer it to shuttle cars or continuous conveyor belts.

Comparability
The US analog is significantly more productive than the Soviet loader. Different rating methods may account for some of the difference in productivity, but even so the Soviet unit appears to be extremely heavy, slow, and underpowered relative to the US analog.

Representativeness
The representativeness of this item cannot be judged. In the early 1970s, between 100 and 200 gathering-arm loaders of all types were produced annually in the United States. The number produced annually in the USSR in the late 1960s is unknown.

Mining and Metallurgical Machinery and Equipment
(Mining Machinery and Equipment)

Item Number 115	***Tsennik:***	36 (72); 271
Self-propelled drilling rig	**Rubles:**	11,220
	Dollars:	70,562
	Ruble-Dollar Ratio:	.16

Soviet Model: SBU-2m

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Tracked, rotary-percussive	Wheeled, rotary-percussive	—
Number of drills	2	2	100
Maximum face height that can be drilled (m)	5	5.2	104
Maximum face width drilled from one position (m)	6	6.1	102
Autofeed drill depth (m) [1]	2.7	3.0	111
Air pressure (kg/cm²)	6	7	117
Propulsion system power (hp)	24	33	138
Weight (tons)	7.25	7.2	99

[1] Depth of usable hole.

Function
Self-propelled drilling rigs are used for drilling blast holes in a horizontal wall face of coal or hard rock.

Comparability
The US rig might be a bit more productive than the Soviet. It can drill holes in a slightly larger work face without moving, can probably drill holes a little faster with its greater air pressure, and, with greater power, probably can move about in the work area a bit faster. The difference in undercarriage (tracked versus wheeled) should not be significant.

Representativeness
The representativeness of this item cannot be judged. About 500 rotary drills of all sizes for underground mining were produced in the United States in 1972. The number produced annually in the USSR in the late 1960s is unknown.

Mining and Metallurgical Machinery and Equipment
(Mining Machinery and Equipment)

Item Number 116	***Tsennik:***	36 (72); 29
Mine roof support system self-advancing	**Rubles:**	298,330
	Dollars:	1,152,619
	Ruble-Dollar Ratio:	.26

Soviet Model: MK-97, Type II

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type [1]	4-leg, hydraulic	6-leg, hydraulic	
Size of coal seam with which system is used (m)	0.8-1.3	1.6-2.5	200-192
Prop bearing capacity (tons)	40	77.2	193
Resistance to caving of roof of a bank of support sets (tons/m)	50	305	610
Mean specific pressure (kg/cm²)			
On seam floor	40.7	33.2	82
On seam roof	10.0	29.9	299
Spacing of support sets (m)	1.6	1.2	75
Distance a support set moves in one advance (mm)	800	838	105
Time required to advance a support set and conveyor (sec)	13	15	115
Number of support sets in support system	100	125	125
Length of one support set along top supports (m)	3.12	3.15	101
Weight of a system of 100 support sets (tons)	201	408	203

[1] For longwall mining.

Function
Mine roof support systems are used in longwall mining in conjunction with a continuous miner and its associated conveyor. After each pass of the miner along the wall of coal, the roof support system advances by means of hydraulic jacks to a new position, pushing the conveyor ahead of it and allowing the roof behind to collapse.

Comparability
The Soviet and US support systems are similar in function, but the US analog is considerably heavier, with much greater load bearing capacity. The difference is explained by the difference in mine roof geology between the two countries. In the mines in which the Soviet system is used the geology is such that the roof tends to break up and collapse immediately behind the support system. In the United States, most mine roofs are of the massive sandrock variety which do not break up easily and require that the support system carry large sections of roof before collapse finally occurs over a large area. The two models are quite similar in the distance and speed with which they advance.

Representativeness
This item is more representative of Soviet production. Longwall mining has only recently become a significant method of mining in the United States in contrast to the USSR, and most of the US equipment has been imported from Western Europe. The number of mine roof support systems produced annually in the USSR in the late 1960s is unknown but was significantly greater than in the United States in the early 1970s.

Mining and Metallurgical Machinery and Equipment
(Mining Machinery and Equipment)

Item Number 117	***Tsennik:***	36 (72); 226
Belt conveyor, 500-meter	**Rubles:**	115,990
	Dollars:	82,676
	Ruble-Dollar Ratio:	1.40

Soviet Model: KRU-260,

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Productivity for coal on a 15° incline (tons/hr)[1]	260	Similar	100
Maximum length of conveyor (m) [2]			
On the horizontal	2,000	2,000	100
On a 15° incline	570	Similar	100
Conveyor belt:			
Type	Rubber wire-reinforced	Synthetic woven carcass [3]	—
Width (mm)	900	914	102
Speed (m/sec)	1.5	1.5	100
Number of electric motors	2	2	100
Power of electric motors (kW)	200	224	112
Weight (with instruments and a set of spare parts) (tons)	83.2	NA	—

[1] The US model will convey at a rated 433 tons per hour on the horizontal. Comparable data are not available for the Soviet model.
[2] The buyer in each case has the option of a conveyor length up to 570 meters on a 15° incline and 2,000 meters on the horizontal, but for this study a standard 500-meter conveyor was used.
[3] With a polyvinylchloride (PVC) covering.

Function
Belt conveyors of this type are used to transport coal from the working part of the mine by way of the main mine shafts to an area where it is transported to the surface.

Comparability
The Soviet and US conveyors are similar in performance. In actual use, the larger motor on the US analog might give it a small advantage in productivity since power is the crucial factor in determining how fast the conveyor belt can move under load. The belt speed of the US analog, therefore, would seem to be more conservatively rated than the speed of the Soviet model.

Representativeness
This item is representative of production in both countries.

Mining and Metallurgical Machinery and Equipment
(Metallurgical Machinery and Equipment)

Item Number 118	***Tsennik:***	39 (72); 2.1.2
Oxygen converter	**Rubles:**	896,680
	Dollars:	1,592,900
	Ruble-Dollar Ratio:	.56

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (tons)	100	100	100
Rotating mechanism	Yes	Yes	—
Foundation	Yes	Yes	—
Refractories	Yes	Yes	—
Oxygen lance system	Yes	Yes	—
Estimated annual capacity (million tons)	1.0 [1] 2.0 [2]	1.0 [1] 2.1 [2]	100 105

[1] Two-converter shop with one of the converters on standby.
[2] Three-converter shop with one of the converters on standby.

Function
An oxygen converter (called a "basic-oxygen-furnace" [BOF] in the United States) is a pear-shaped refractory-lined steel vessel that is used to hold steel scrap, molten pig iron, and various additives in the process of making steel. The refining is done by blowing high-purity oxygen through oxygen lances into the vessel at supersonic speeds. The finished molten steel is poured from the converter into steel teeming ladles.

Comparability
The rated capacity of the Soviet and US converters are the same. In practice, each country has been able to exceed the rated capacity of a converter shop. Factors which make this possible include intensified use of oxygen, the use of computers to ensure expeditious preparation of the charge and turning of the melt, a continual supply of hot metal and other charge materials, and a sufficient demand from the rolling and finishing departments to warrant the higher level of output of crude steel. Without all these factors, a converter shop may operate at less than rated capacity.

Representativeness
This item is representative of production in both countries, with converters of 100-ton capacity responsible for a significant share of their respective outputs of steel. These converters have replaced the smaller size that were used in the early stages of converter steelmaking, and, in recent years, converters of more than 100-ton capacity have gained greater acceptance in both countries.

Mining and Metallurgical Machinery and Equipment
(Metallurgical Machinery and Equipment)

Item Number 119	***Tsennik:***	39 (72); 2.1.1
Oxygen converter	**Rubles:**	1,847,500
	Dollars:	2,470,700
	Ruble-Dollar Ratio:	.75

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (tons)	250-300	250	100-83
Rotating mechanism	Yes	Yes	—
Foundation	Yes	Yes	—
Refractories	Yes	Yes	—
Oxygen lance system	Yes	Yes	—
Estimated annual capacity (million tons)	2.0 [1] 4.0 [2]	2.25 [1] 3.5 [2]	112 88

[1] Two-converter shop with one of the converters on standby.
[2] Three-converter shop with one of the converters on standby.

Function
An oxygen converter (called a "basic-oxygen-furnace" [BOF] in the United States) is a pear-shaped refractory-lined steel vessel that is used to hold steel scrap, molten pig iron, and various additives in the process of making steel. The refining is done by blowing high-purity oxygen through oxygen lances into the vessel at supersonic speeds. The finished molten steel is poured from the converter into steel teeming ladels.

Comparability
The Soviet and US converters are reasonably comparable as highly productive steelmaking furnaces. There is a size difference which is reflected in the respective nominal ratings for annual capacity. It is not feasible to look for comparability in features other than size and nominal capacity. US converters with similar nominal capacities vary considerably in shape and other design features. Soviet converters are much more standardized. Also, operations at individual converter shops invariably require some degree of adaption to other facilities and operations at their respective plant sites. The pace and volume of production is influenced by factors such as raw material availability; grades of steel being produced; imbalances in blast furnace, steelmaking, and rolling and finishing capacities; and level of demand.

Representativeness
This item is more representative of US production. Converters with capacities of from 250 to 300 tons per heat (time required to produce one batch) presently account for an important share of steel output in both countries, but this was not true of the USSR around 1967. In the United States, where the oxygen converter steelmaking method gained rapid acceptance, a considerable number of units of about 200 tons per heat were introduced soon after the early 100-ton units and prior to the move to 250- and 300-ton units. In the USSR, where oxygen converter steelmaking was adopted far more slowly than in the United States, units with capacities of about 100 to 150 tons per heat were the most common size until the 1970s, when 250- and 300-ton units became the standard.

Mining and Metallurgical Machinery and Equipment
(Metallurgical Machinery and Equipment)

Item Number 120	*Tsennik:*	39 (72); 2.4.77
Steel teeming ladle	**Rubles:**	33,110
	Dollars:	56,700
	Ruble-Dollar Ratio:	.58

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (tons)	270	272	101
Weight (tons)	46	47.7	104

Function
Steel teeming ladles, also called "bottom pour ladles," are used to receive the molten steel from the steelmaking furnace (oxygen, open hearth, or electric arc). The full ladles then are transported, usually by crane, to the teeming (pouring) aisle and emptied from the bottom into ingot molds or to a continuous casting machine and emptied into casts for billets, blooms, or slabs.

Comparability
The Soviet and US ladles are closely comparable in performance. Regardless of any differences in the methods of manufacture or in specific design, the two ladles serve essentially the same purpose. They are similar in weight and handle the same amounts of steel.

Representativeness
This item is representative of production in both countries.

Mining and Metallurgical Machinery and Equipment
(Metallurgical Machinery and Equipment)

Item Number 121	*Tsenniki:*	39 (72); 2.4.62
Hot metal mixer	**Kubles:**	242,040
	Dollars:	2,103,000
	Ruble-Dollar Ratio:	.12

Soviet Model: No model number

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (tons)	1,300	1,300	100
Type	Cylindrical	Cylindrical	—
Tilting mechanism	Yes	Yes	—
Refractories	Yes	Yes	—
Weight (tons)	339	520	153

Function
A hot metal mixer is a large, refractory-lined vessel used to hold molten blast furnace pig iron before it is used in the manufacture of steel. It assures the ready availability of hot metal when needed for charging, and it serves as a blender to even out possible differences in individual batches of pig iron. Mixers are used in open hearth and Bessemer converter steelmaking shops.

Comparability
The Soviet and US mixers are well matched. They undoubtedly would operate at about the same efficiency, considering the simplicity of their function. The considerably greater weight of the US analog is surprising. It could be that the USSR has used lighter weight, high strength–low alloy steels in place of carbon steel, that the US mixer is made with heavier reinforcing bands for added safety, or a combination of these factors.

Representativeness
This item is more representative of Soviet production. Mixers are in extensive use in the USSR because open-hearth furnaces still account for more than one-half of total steel output. In the United States, open-hearth furnaces account for only about one-sixth of total steel output, reflecting the steadily increasing use of basic oxygen converters and electric furnaces as the leading methods of steelmaking. Bessemer converter steelmaking is almost completely phased out in both countries.

Pumps and Compressors

Item Number 122	*Tsennik:*	7 (72); 1109
Gasoline pump [1]	**Rubles:**	64
	Dollars:	496
	Ruble-Dollar Ratio:	.13

Soviet Model: STsL-00

Specifications:	USSR	US	Difference (US as percent of USSR)
Type	2-stage, self-priming	1-stage, self-priming	—
Delivery rate (ltrs/min)	299	303	101
Head (m) [2]	30	32	107
Power of electric motor (kW)	6.8	5.0	74
Weight (kg)	67	118	176

[1] Although referred to as a gasoline pump, this unit may also be used to pump other liquids such as kerosene and diesel fuel.
[2] Refers to "pressure head," which is a standard method of describing the output pressure of a pump. For example, a 30-meter head refers to the pressure at the bottom of a 30-meter column of liquid.

Function
Gasoline pumps of this type may also be called refinery pumps because they can pump several liquid products of a refinery such as gasoline, kerosene, and diesel fuel. It is important that the pumps be compatible with the corrosive effects and lack of lubricity of the fuels to be pumped.

Comparability
The Soviet and US pumps are comparable in pumping performance (delivery against head). The greater weight of the US pump indicates a larger frame which may provide for a better sealing of the rotor shaft. The lesser horsepower of the US pump indicates higher efficiency in energy use.

Representativeness
This item is more representative of US production.

Pumps and Compressors

Item Number 123	*Tsennik:*	7 (72); 1079
Submersible crude oil pump, centrifugal	**Rubles:**	1,460
	Dollars:	2,090
	Ruble-Dollar Ratio:	.70

Soviet Model: ETsNI6-160-1100

Specifications:	USSR	US	Difference (US as percent of USSR)
Delivery rate (bbls/day)	1,000	1,000	100
Lift (m)	975	975	100
Efficiency (percent)[1]	50	50	100
Power of the electric motor (hp)	47	50	106
Weight (kg)	233	210	90

[1] Combined efficiency of the pump and the electric motor.

Function
Submersible crude oil pumps are multiple-stage (100 to 150) centrifugal units that are used to extract crude oil from deep oil wells.

Comparability
The Soviet and US models are similar in performance. There is a good possibility that the Soviet model is patterned after the US analog.

Representativeness
This item is more representative of US production. Several thousand or more pumps of this type were produced annually in the United States in the early 1970s. Production in the USSR in the late 1960s is unknown but probably less. The USSR has been importing pumps of this type from the United States for a number of years.

Pumps and Compressors

Item Number 124	***Tsennik:***	7 (72); 1176
Crude oil pipeline pump	**Rubles:**	10,530
	Dollars:	34,852
	Ruble-Dollar Ratio:	.30

Soviet Model: 24ND-14X1

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Single-stage, double-suction	Single-stage, double-suction	—
Delivery (bbls/hr)	25,160	25,160	100
Head (m) [1]	216	216	100
Pump efficiency (percent)[2]	87	86	99
Shaft speed (rpm)	3,000	1,800	60
Power of electric motor (hp)	3,350	3,500	104
Weight (kg)	7,000	7,847	112

[1] Refers to "pressure head," which is a standard method of describing the output pressure of a pump. For example, a 216-meter head refers to the pressure at the bottom of a 216-meter column of liquid.
[2] Efficiency at the rated delivery and pressure head when pumping water, the conventional rating method. The actual efficiency in pumping crude oil will be somewhat lower than that shown and will vary with the specific gravity and viscosity of the crude oil.

Function
Pipeline pumps are used to supply the pressure head required to transport crude oil through large pipelines over long distances.

Comparability
The greater weight of the US analog reflects the fact that it of necessity must be a larger unit in order to deliver the same volume as the Soviet model at one-half of the Soviet speed.

Representativeness
This item is representative of production in both countries. Hundreds are made annually in each country.

Pumps and Compressors

Item Number 125	*Tsennik:*	8 (72); 36
Piston compressor, air	**Rubles:**	20,500
	Dollars:	36,424
	Ruble-Dollar Ratio:	.56

Soviet Model: 2M10-50/8

Specifications:	USSR	US	Difference (US as percent of USSR)
Type [1]	Opposed cylinder	L-shaped	—
Lubricated cylinders	Yes	Yes	—
Capacity (m^3/min)	50	52	104
Delivery pressure (atm)	9	8.5	94
Suction pressure (atm)	1	1	100
Shaft speed (rpm)	500	514	103
Cooling water consumption (ltrs/hr)	9,990	8,630	86
Power of electric motor (kW)	320	261	82
Weight (kg) [2]	9,500	9,525	100

[1] Both models are two-stage, crosshead, water cooled, direct drive.
[2] Without the electric motor.

Function
Reciprocating piston-type air compressors are used extensively to supply compressed air for pneumatic equipment in a variety of industries.

Comparability
The L-shaped design of the US analog results in a more compact, space-saving unit, but the weight is about the same as the Soviet model because of the more elaborate counterbalancing required by such a design.

Representativeness
This item is representative of production in both countries.

Pumps and Compressors

Item Number 126	*Tsennik:*	8 (72); 204
Piston compressor, air [1]	**Rubles:**	9,270
	Dollars:	13,930
	Ruble-Dollar Ratio:	.67

Soviet Model: 2S2GP-10/8

Specifications:	USSR	US	Difference (US as percent of USSR)
Capacity (m^3/min)	10	11.3	113
Lubricated cylinders	No	No	—
Delivery pressure (atm)	8	8.5	106
Shaft speed (rpm)	735	480	65
Cooling water consumption (ltrs/hr)	2,990	NA	—
Power of electric motors (kW)	75	75	100
Weight (kg) [2]	4,650	5,786	124

[1] Both models are two-stage, crosshead, water cooled.
[2] With electric motor.

Function
Reciprocating piston-type air compressors are used extensively to supply compressed air for pneumatic equipment in a variety of industries.

Comparability
The Soviet and US models are roughly similar in performance. The US analog can deliver more compressed air at slightly higher pressure. Whether this is a significant advantage in a plant would depend upon the application. The slower shaft speed is simply a design feature that is not directly related to capacity, although it might serve to prolong the life of the unit. The greater weight of the US analog is explained in part by its greater capacity, there being a direct correlation in compressors between weight and capacity.

Representativeness
This item is representative of production in both countries.

Pumps and Compressors
(Chemical Industry Machinery and Equipment)

Item Number 127	***Tsennik:***	50 (72); 625
Air separation plant	**Rubles:**	1,122,175
	Dollars:	2,794,700
	Ruble-Dollar Ratio:	.40

Soviet Model: AKT-16 (BR-6M)

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Low pressure	Low pressure	—
Volume of intake air (thousand m^3/hr)	48.5	Similar	100
Pressure (atm)	6	Similar	100
Capacity (thousand m^3/hr):			
Process oxygen [1]	8.85	Similar	100
High-purity oxygen [2]	0.15	Similar	100
Refined nitrogen [3]	16	Similar	100
Neon-helium mixture [4]	Insignificant	Similar	100
Power consumption (kW hr/m^3):			
Process oxygen	0.42	0.42	100
High-purity oxygen	0.67	0.32	48
Refined nitrogen	0.07	NA	—
Weight (tons) [5]	406.5	NA	—

[1] 95 percent purity; 50 centimeters water gauge pressure.
[2] 99.5 percent purity; 165 atmospheres pressure.
[3] 99.998 percent purity; 50 centimeters water gauge pressure.
[4] 100 percent purity; 4 atmospheres pressure. In the United States, neon-helium mixtures normally would not be recovered from an air separation plant of this size.
[5] Without insulation and packing.

Function
Air separation plants are used to separate various chemical elements from the air. The models being considered here separate process oxygen, high-purity oxygen, refined nitrogen, and neon-helium; other models might be designed to separate other elements such as argon or krypton.

Comparability
There is little apparent difference between the Soviet model and the US analog because the latter is the US manufacturer's estimate for equipment that would be needed to match the performance of the Soviet model.

Representativeness
This item is more representative of Soviet production. A model with closely similar specifications apparently is not produced in the United States as a standard item.

Pumps and Compressors
(Chemical Industry Machinery and Equipment)

Item Number 128	***Tsennik:***	53 (72); 11
Cyclone	**Rubles:**	14,449
	Dollars:	8,372
	Ruble-Dollar Ratio:	1.73

Soviet Model: SK-TsN-34

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Quantity of air being purified (m^3/sec)	14-15	12.7-14.7	91-98
Resistance, water gauge (mm)	35-45	35-45	100
Cylinder diameter (m)	3.6	3.3	92
Height of cylinder and cone (m)	9.4	9.2	98
Weight (kg)	10,660	6,010	56

Function
Cyclones of this type are used in the carbon black and other industries to separate dust from dust-laden gas by means of centrifugal force.

Comparability
The match is close since the US analog closely approximates the capacity of the Soviet model at equivalent resistance. The great difference in weight may be explained in part by the Soviet use of heavier materials to compensate for poorer corrosion qualities.

Representativeness
The representativeness of this item cannot be judged.

Pumps and Compressors
(Chemical Industry Machinery and Equipment)

Item Number 129	***Tsennik:***	54 (72); 243
Truck tire assembly machine	**Rubles:**	30,060
	Dollars:	59,011
	Ruble-Dollar Ratio:	.51

Soviet Model: APDI-3; 110-11

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (tires/hr) [1]	2.25	Similar	100
Dimensions of assembly drums (mm)			
Diameter [2]	675 and 760	610-775	80-115
Maximum width	650	660	102
Number of drum speeds	2	3	150
Weight (kg)	6,500	4,173	64

[1] Assembling radial tires, size 12-20.
[2] At maximum diameter.

Function
Tire assembly machines of this type put together common-sized truck tires from layers or belts of rubber, nylon, polyester, steel, or other materials. The tires go from these assembly machines to autoclaves where they are vulcanized under heat and pressure.

Comparability
The Soviet and US machines are similar in function but not in performance. The Soviet model has less than 50 percent of the capacity of the US analog and is considered obsolete by US standards. The servicer on the Soviet model is similar to one designed in the United States in the early 1950s.

Representativeness
The Soviet model probably is representative of such equipment produced in the USSR in the late 1960s. The representativeness of the US model is not known.

Pumps and Compressors
(Chemical Industry Machinery and Equipment)

Item Number 130	***Tsennik:***	54 (72); 240
Passenger car tire assembly machine	**Rubles:**	38,971
	Dollars:	38,472
	Ruble-Dollar Ratio:	1.01

Soviet Model: SPP-66;111-66

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type	Semiautomatic	Automatic	—
Capacity (tires/hr) [1]	15.5	18.75	121
Tire sizes, bead			
Diameters (in)	13-16	12-20	92-125
Dimensions of assembly drums (mm)			
Diameter [2]	350 and 467	355-540	76-116
Maximum width	550	673	122
Number of drum speeds	2	3	150
Weight, w/o servicer (kg)	4,027	2,087	52

[1] Assembling 4-ply tires, size 6.70-15.
[2] At maximum diameter.

Function
Tire assembly machines of this type put together a wide range of tires for passenger cars from layers or belts of rubber, nylon, polyester, steel, or other materials. The tires go from these assembly machines to autoclaves where they are vulcanized under heat and pressure.

Comparability
The US analog is superior in performance and design to the Soviet model. For example, one-fifth greater capacity is achieved with little more than one-half of the weight.

Representativeness
This item probably is more representative of Soviet production. The Soviet model probably reflects design developments of the late 1960s. The servicer used with it closely resembles one designed in the United States in 1963. The US analog is considered rather obsolete in the United States.

Pumps and Compressors
(Chemical Industry Machinery and Equipment)

Item Number 131	***Tsennik:***	9 (73); 328
Acid-resistant reactor	**Rubles:**	3,660
	Dollars:	16,284
	Ruble-Dollar Ratio:	22

Soviet Model: RSEN-3200

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (ltrs)	3,200	3,330	104
Pressure (kg/cm²)			
Apparatus	3	7	233
Jacket	6	6.3	105
Maximum temperature (°C)			
Apparatus	300	232	77
Jacket	300	343	114
Speed of stirrer (rpm)	45.5	45.5 [1]	100
Power of electric motor (kW)	4.5	4.5 [1]	100
Weight (kg)	3,205	3,650	114

[1] Purchaser may have any stirring speed and electric motor that he desires.

Function
Acid-resistant reactors of this type are designed to carry out chemical processes on corrosive liquids to change them into another product through the application of pressure, heating (or cooling), and stirring. Catalysts or additives may be introduced in the process. For example, ethylene may be placed in a reactor to produce an effluent used in the production of polyethylene.

Comparability
The Soviet and US models are similar in function but not in the performance aspects of pressure and temperature. The higher operating pressure of the US analog extends its range of possible operations beyond that of the Soviet model. If highly acidic materials were involved, it is doubtful that the Soviet model could maintain continuous operation at the temperatures given. Performance also depends crucially on the materials of construction, and these are not known for the Soviet model.

Representativeness
The representativeness of this item in the production of the USSR and the United States cannot be judged.

Pumps and Compressors
(Chemical Industry Machinery and Equipment)

Item Number 132	*Tsennik:*	9 (73); 181
Centrifuge [1]	**Rubles:**	4,100
	Dollars:	38,922
	Ruble-Dollar Ratio:	11

Soviet Model: PM1200-600N

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rotor capacity (ltrs)	300	303	101
Diameter (mm)	1,200	1,219	102
Filter area (m^2)	NA	1.95	—
Centrifugal force (G)	NA	800	—
Weight (kg)	1,370 [2]	3,992	291

[1] The type is intermittent action, suspended, vertical, bottom discharge, and upper drive.
[2] The reported weight is not consistent with the rotor capacity and diameter of the centrifuge.

Function
Centrifuges of this type are used to filter a solid from a liquid-solid slurry by forcing out the liquid through the filter medium held around the inside of the rapidly rotating basket. The solid is left in place in the basket to be washed and spun "dry" and then is removed in preparation for a repeat cycle. A normal period for a cycle is about five minutes.

Comparability
The rotor capacity and diameter are closely matched, but the absence of Soviet data on filter area and centrifugal force makes a comparison uncertain. However, since rotor capacity and diameter tend to determine filter area and centrifugal force, the missing specifications may be similar to those of the US analog. The match probably is close.

Representativeness
This item is representative of production in both countries. More than 80 percent of Soviet chemical equipment was produced in lots of five or less in the late 1960s. With an even greater variety of models of similar size and capacity in the United States, output probably was also small for individual models.

Logging and Paper Machinery and Equipment

Item Number 133	*Tsennik:*	30 (73); 54
Log kicker	**Rubles:**	881
	Dollars:	1,744
	Ruble-Dollar Ratio:	.51

Soviet Model: SBR-4-2

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum length of logs handled (m)	8	8	100
Diameter of logs handled (mm) [1]	120-650	Similar	100
Number of kicker levers	3	3	100
Power of main drive motor (kW)	3	— [2]	—
Weight (kg)	800	682	85

[1] Diameter at the butt end.
[2] It is normal US practice to use a pneumatic or hydraulic cylinder rather than an electric motor. The US model is operated by an 8-inch pneumatic cylinder.

Function

Log kickers of this size and type, called stop and loaders in the United States, are used to control the flow of logs to the saw by stopping them as they roll down a conveyor and then permitting individual logs to be passed on to the sawing area as needed.

Comparability

The Soviet and US units are similar in performance. The greater weight of the Soviet model probably is explained by (1) its being built more massively for strength, and (2) its being driven by an electric motor, which would involve a significantly different driving mechanism than that associated with the pneumatic cylinder of the US analog.

Representativeness

This item probably is representative of production in both countries.

Light Industry Machinery and Equipment
(Textile Machinery and Equipment)

Item Number 134 (foreign model)	***Tsennik:***	34 (73); 95
Industrial sewing machine	**Rubles:**	389
	Dollars:	759
	Ruble-Dollar Ratio:	.51

Soviet Model: Class 262

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum speed of main shaft (rpm)[1]	4,000	4,000	100
Maximum length of stitch (mm)	4	4.2	105
Maximum thickness of materials that can be sewn (mm)	6	9.1	152
Size of flat bed (mm)	518 x 178	476 x 178	92
Arm length (mm) [2]	265	244	92
Dimensions of head (mm)			
Length	560	527	94
Width	178	178	100
Height	400	346	86
Head weight (kg)	36	32	89

[1] Depending upon thickness and strength of materials being sewn together.
[2] From needle to base of arm.

Function
Sewing machines of this type (sometimes called seaming machines in the United States) are used for high-speed seaming operations in the manufacture of outer garments such as coats and work clothes from heavy-weight materials.

Comparability
The major difference between the Soviet and US analog is in the thickness of the materials that can be sewn. However, the lowness of the Soviet figure was questioned by US manufacturers, given the other specifications of the machine, and may be in error. The US analog is foreign made, since this class of machine is not made in the United States.

Representativeness
This item is more representative of Soviet production. The United States produces other sewing machines that are somewhat like the Soviet model, but they do not match the Soviet model as closely as the analog included here, which was made abroad. The analog has been widely used in the United States, however, for a number of years.

Light Industry Machinery and Equipment
(Textile Machinery and Equipment)

Item Number 135	***Tsennik:***	34 (73); 138
Industrial sewing machine	**Rubles:**	1,052
	Dollars:	2,452
	Ruble-Dollar Ratio:	.43

Soviet Model: Class 29

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Number of stitches per minute	1,500	1,600	107
Buttonhole lengths that can be made (mm)	16-38	16-44	100-116
Maximum thickness of sewn materials (mm)	8	6	75
Types of buttonholes	[1]	[1]	—
Dimensions of head (mm)			
Length	550	533	97
Width	400	394	98
Height	500	470	94
Power of electric motor (kW)	0.52	0.25	48
Weight (kg)	65	66	102

[1] Both machines will make the following six types of buttonholes: round eyelet, pear-shaped eyelet, or straight buttonhole, each with or without taper fastening.

Function
Sewing machines of this type (called buttonholers in the United States) make buttonholes on suits, raincoats, and other outer garments of a variety of materials.

Comparability
The Soviet and US machines are similar in performance. The more powerful electric motor on the Soviet model probably explains why it is able to sew somewhat thicker materials.

Representativeness
This item is representative of production in both countries.

Light Industry Machinery and Equipment
(Textile Machinery and Equipment)

Item Number 136	***Tsennik:***	33 (73); 229
Wool picking machine	**Rubles:**	2,830
	Dollars:	11,296
	Ruble-Dollar Ratio:	.25

Soviet Model: TP-90 Sh

Specifications:	**USSR**	**US**	**Difference (US as percent of USSR)**
Productivity for unpicked wool (kg/hr)[1]	300 [2]	158 [2]	53
Working width (mm)	900	914	102
Cylinder speed (rpm)	320	600	188
Power of electric motor (kW)	4.5	7.5	167
Weight (kg)	2,750	2,500	91

[1] In continuous operation.
[2] Midpoint of a range of 200 to 400 for the Soviet model and 135 to 180 for the US model.

Function
Wool picking machines (called carding waste pickers in the United States) are designed to remove all of the remaining impurities from scoured dry wool.

Comparability
The Soviet and US machines are similar in function, but the Soviet model is rated at twice the productivity of the US analog. There seems to be no apparent reason for such a major difference, given the superiority of the US analog in power and speed and a similarity in weight. It may be due to a difference in the way the units are rated.

Representativeness
This item probably is more representative of Soviet production. The major shift to synthetics has reduced the importance of wool picking machines in the United States.

Light Industry Machinery and Equipment
(Textile Machinery and Equipment)

Item Number 137	***Tsennik:***	33 (73); 77
Fly frame	**Rubles:**	7,710
	Dollars:	36,381
	Ruble-Dollar Ratio:	.21

Soviet Model: R-168-3

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Spindle gauge (mm) [1]	168	273	162
Number of spindles	76	72	95
Maximum bobbin rail lift (mm) [2]	250	305	122
Maximum diameter of wound bobbin (mm)	125	140	112
Maximum spindle speed (rpm)	1,300	1,800	138
Length of treated fiber (mm)	28-42	22-51	79-121
Total draft [3]	2.5-31.8	2.5-29.45	100-93
Power of electric motor (kW)	1.7	5.6	329

[1] Refers to distance between spindle centers.
[2] Refers to the height of the winding on the bobbin.
[3] Refers to the minimum and maximum ratios of the roving diameter of the cylindrical cans to the drafted roving diameter.

Function
Fly frames (called roving frames in the United States) are complex machines used in the yarn preparatory department of textile mills that take strands of loosely entwined fibers from cylindrical containers and combine them in predetermined amounts and ways to produce a strip or roving (that is, more closely entwined fibers) on spindles.

Comparability
The US analog is the more productive of the two. It not only winds larger bobbins (packages) as shown by the data on spindle gauge, rail lift, and diameter, but its more powerful motor provides faster winding than on the Soviet model of these larger packages. These features more than make up for the smaller number of spindles.

Representativeness
This item is representative of production in both countries, although the particular configuration of the US analog used here is not the most common. A very wide variety of options and configurations is characteristic of the production of fly (roving) frames in the United States.

Light Industry Machinery and Equipment
(Textile Machinery and Equipment)

Item Number 138	***Tsennik:***	33 (73); 93
Spinning frame	**Rubles:**	13,588
	Dollars:	18,466
	Ruble-Dollar Ratio:	.74

Soviet Model: PL-66-6

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Number of spindles per frame	368	360	98
Height of the winding (mm)	200 and 230	229 and 254	112
Maximum spindle speed (rpm)	12,000	15,000	125
Direction of twist	Right	Left or right	—
Bobbin size diameter (mm)	155 x 300	140 x 305	47-197
Maximum power of main motor (kW)	10	15	150

Function
Spinning frames of this type use the strip or roving produced by a fly (or roving) frame and produce warp cotton yarn from it.

Comparability
The US analog is a more productive and more sophisticated machine than the Soviet because of its faster spindle speed. Increasing spindle speed by even 500 rpm requires fundamental and extensive changes in interior design if component and yarn failures are to be kept within bounds. For example, operating the Soviet frame at 12,500 rpm rather than 12,000 rpm could well increase yarn breakage as much as two or three times, and the unit probably could not operate at all at 13,000 rpm. While the larger motor on the US analog does not automatically assure faster spindle speed, it is necessary for faster speed.

Representativeness
This item is representative of production in both countries.

Light Industry Machinery and Equipment

(Leather Industry Machinery and Equipment)

Item Number 139	*Tsennik:*	35 (73); 21
Oiling drum for leather	**Rubles:**	1,020
	Dollars:	5,522
	Ruble-Dollar Ratio:	.18

Soviet Model: BZhA

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Drum:			
Volume (m^3)	6.4	8.8	138
Inside diameter (mm)	2,500	2,286	91
Length (mm)	1,300	2,134	164
Turning speed (rpm)	13	13	100
Made of wood	Yes	Yes	—
Access door	Yes	Yes	—
Fan and calorifier	Yes	No	—
Power of electric motor (kW)	4.5	11.2	249
Weight (kg)	2,800	3,865	138

Function

Drums of this type are used for oiling chiefly hard leather and Russian leather but not chrome-tanned leather. Some models introduce air and heat during the oiling process.

Comparability

The Soviet and US drums are roughly similar in function and performance. The major difference is in the significantly greater length (and, therefore, volume) of the US analog. Apparently there are standard *minimum* lengths for these drums (depending upon the diameter) even though they are custom made to purchasers' order. US manufacturers tend to use extra powerful electric motors to prevent inadvertent overloading. US manufacturers could not recall ever having supplied a drum of this type with a fan and calorifier for heat, primarily because they are more often used for tanning than for oiling leather, and heat is not required. Heat, if needed, is provided by a means selected by the buyer.

Representativeness

This item probably is more representative of Soviet production. There is not a great deal of leather working done in the United States that requires this type of equipment.

Food Industry Machinery and Equipment

Item Number 140	*Tsennik:*	80 (72); 233
Beet sugar preclarifier	**Rubles:**	2,000
	Dollars:	6,232
	Ruble-Dollar Ratio:	.32

Soviet Model: PR-15

Specifications:	USSR	US	Difference (US as percent of USSR)
Productivity (thousand tons of beets/day)	1.5	Similar	100
Working volume (m^3)	10.7	Similar	100
Main shaft speed (rpm)	75	Similar	100
Main cylinder dimensions, diameter/height (cm)	180 x 475	Similar	100
Power of electric motor (kW)	7	Similar	100
Weight (kg)	3,048	Similar	100

Function
Beet sugar preclarifiers are used in beet sugar production for the preliminary clarifying of the raw beet sugar juice prior to the main clarifying process. Nonsugar elements contained in the raw sugar juice are cleaned out in preclarification through a milk of lime treatment.

Comparability
The US analog is custom made, based on Soviet specifications. However, US technology and materials were used, and therefore it is not an exact duplicate. Precise data for the US analog were not provided.

Representativeness
This item is more representative of Soviet production. There are a number of variations in the processes used to produce sugar from sugar beets, and the most popular method in the United States does not use a preclarifier. Consequently, few have been produced. The number produced in the USSR is unknown, but they apparently are common in the industry.

Food Industry Machinery and Equipment

Item Number 141	*Tsennik:*	80 (72); 447
Beet sugar evaporator	**Rubles:**	26,260
	Dollars:	165,220
	Ruble-Dollar Ratio:	.16

Soviet Model: VTs-2360-62

Specifications:	USSR	US	Difference (US as percent of USSR)
Heating surface (m^2)	2,360	2,360	100
Weight (tons)	47.4	55.8	118

Function

Evaporators of this type are used in beet sugar processing plants to convert clarified raw sugar juice into a syrup through the repeated application of heat to remove the water. They are set up in stations of three to five evaporators.

Comparability

The performance, that is, the heating surface, of the Soviet and US models is the same. The greater weight of the US analog apparently is the result of differences in materials and design. No other specifications were provided for the analog.

Representativeness

This item is more representative of Soviet production. The United States has never produced very many evaporators of this type compared with the USSR, where acreage devoted to sugar beets is more than six times that in the United States.

Printing Machinery and Equipment

Item Number 142 (foreign model)	*Tsennik:*	94 (72); 26
Metal-type composing machine	**Rubles:**	7,540
	Dollars:	16,278
	Ruble-Dollar Ratio:	.46

Soviet Model: MO-5

Specifications:	USSR	US	Difference (US as percent of USSR)
Letter and space point (p)	Up to 12	Up to 12	100
Matrixes per frame	288	272	94
Type of heat	Electric	Electric	—
Power of electric motor (kW)	0.6	0.6	100
Weight (kg)	1,100	690	63

Function

Metal-type composing machines are used for the automatic setting of metal type. They are found primarily in printing enterprises which specialize in the production of scientific and technical literature, dictionaries, manuals, and other publications that are especially complex in composition.

Comparability

There is a good chance that the Soviet model is based on the analog. That being the case, there seems to be no obvious reason for the great difference in weight. Perhaps the Soviet figure is in error. Composing machines require a great deal of skill in component production and assembly if they are to permit consistently high quality printing over time, and in this respect the analog undoubtedly is superior to the Soviet model.

Representativeness

This item is more representative of Soviet production. The US-designed analog actually is foreign made, production having ceased in the United States in the 1960s as faster and less expensive printing processes based on photography came into widespread use. Composing machines were in regular production in the USSR in the late 1960s, but annual output is unknown.

Printing Machinery and Equipment

Item Number 143 (foreign model)	***Tsennik:***	94 (72); 45
Large-point metal-casting machine	**Rubles:**	4,930
	Dollars:	9,777
	Ruble-Dollar Ratio:	.50

Soviet Model: NShL-4

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Point size (p)	Up to 48	Up to 72	150
Type of heat	Electric	Electric	—
Melting pot capacity (kg)	18	38.5	214
Power of electric motor (kW)	0.6	0.6	100
Weight (kg)	580	673	116

Function
Large-point metal-casting machines cast the large-point letters and spacing materials used in hand composition for making titles, headlines, advertising, and other types of printing to complement the smaller printing normally used for text.

Comparability
There is a good chance that the Soviet model, like the analog, is based on an early model of casting machine produced in the United States some years ago. The two units are used in the same type of work and function in the same way, but the analog is capable of casting larger letters and, with its larger melting pot, more of them in a given time. With a special matrix holder and an attachment, the analog actually can use the same type of matrices used on the Soviet model. Metal-casting machines require a great deal of skill in component production and assembly if they are to cast consistently high quality type over time, and in this respect also the analog undoubtedly is superior to the Soviet model.

Representativeness
This item is more representative of Soviet production. The analog is based on an earlier US design but is foreign made, production of the earlier model having ceased in the United States in the 1960s as faster and less expensive printing processes based on photography came into widespread use. Metal-casting machines were in regular production in the USSR in the late 1960s, but annual output is unknown.

Hoist-Transport Equipment

Item Number 144	*Tsennik:*	10 (73); 228
Fork lift, electric	**Rubles:**	2,310
	Dollars:	5,238
	Ruble-Dollar Ratio:	.44

Soviet Model: EP-05 (4015M)

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated lift capacity (kg)[1]	500	675	135
Speed of load ascent (m/min)	10.0	18.3	183
Travel speed on hard surface (km/hr)			
With load	9.0	8.4	93
Without load	12.0	9.6	80
Length of fork (mm)	730	762	104
Maximum lift height of fork (mm)[2]	1,800	2,690	149
Minimum turning radius (mm)	1,280	1,170	91
Weight (kg)	1,480	1,923	130

[1] Lift capacity at 500 millimeters load center for both models. Load center is the distance from the center of the load to the front of the rear upright of the lifting fork. The shorter the load center distance, the greater the lift capacity. The lift capacity of the US model ranges from 590 kilograms with a load center of 600 millimeters to 816 kilograms with a load center of 380 millimeters. Data on the range of lift capacities of the Soviet model are not available.
[2] The Soviet model also is offered with optional lifting heights of 2,800 and 4,500 millimeters. The US model is offered with optional lifting heights of 3,048, 3,302, and 3,658 millimeters.

Function

Small electric fork lifts are used for movement and stacking/unstacking of boxes and other materials inside assembly plants, large buildings, and similar areas.

Comparability

The Soviet and US models are roughly comparable in performance. Each has certain advantages, but the US analog has overall superiority. The analog can lift more, lift a load faster, lift to a greater height with a standard fork, and work in a smaller area due to a smaller turning radius. The main advantage of the Soviet model is its faster travel speed, a useful feature in moving loads over long distances such as in huge plants or warehouses. With optional forks for each model to get maximum height, the Soviet model also can lift a load 23 percent higher than the US analog.

Representativeness

This item is more representative of US production. About 19,200 electric fork lifts were produced in the United States in 1972. The number produced in the USSR in 1967 is unknown but probably significantly smaller.

Hoist-Transport Equipment

Item Number 145	***Tsennik:***	10 (73); 219
Fork lift, gasoline engine	**Rubles:**	3,600
	Dollars:	9,836
	Ruble-Dollar Ratio:	.37

Soviet Model: 4022

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rated lift capacity (kg)[1]	2,000	1,814	91
Speed of load ascent (m/min)	16	26.8	168
Travel speed on hard surface (km/hr)			
With load	21	19.8	94
Without load	24	20.0	83
Length of fork (mm)	900	1,067	119
Maximum lift height of fork (mm)	4,500	3,910	87
Minimum turning radius (mm)	2,100	2,141	102
Weight (kg)	3,170	3,640	115

[1] Lift capacity at 600 millimeters load center for both models. Load center is the distance from the center of the load to the front of the rear upright of the lifting fork. The shorter the load center distance, the greater the lift capacity. The lift capacity of the US model ranges from 1,050 kilograms with a load center of 1,219 millimeters (using an optional fork) to 2,000 kilograms with a load center of 500 millimeters. Data on the range of lift capacities of the Soviet model are not available.

Function

Fork lifts of this lifting capacity are used for movement and stacking/unstacking of boxes and other heavy materials in and out of doors in a variety of industrial areas such as warehouses, construction sites, and port areas.

Comparability

The Soviet and US models are roughly comparable in performance. Each has certain advantages, but the Soviet model probably has overall superiority in most applications. It can lift more, lift to a greater height, travel faster, and work in a slightly smaller area due to a smaller turning radius. The main advantage of the US analog is its speed of lifting a load. There are situations (plenty of room to maneuver, short travel distances, and loads at lift capacity) in which this fast lifting speed probably would permit the US analog to move as much material in a given time as the Soviet model.

Representativeness

This item is more representative of US production. About 28,000 engine-powered fork lifts capable of lifting 2,700 kilograms or less were produced in the United States in 1972. The number produced in the USSR in 1967 is unknown but probably significantly smaller.

Hoist-Transport Equipment

Item Number 146	***Tsennik:***	10 (73); 226
Fork lift, gasoline engine	**Rubles:**	8,370
	Dollars:	21,199
	Ruble-Dollar Ratio:	.39

Soviet Model: 4008

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Rated lift capacity (kg)[1]	10,000	9,305	93
Speed of load ascent (m/min)	6.5	13.4	206
Travel speed on hard surface (km/hr)			
With load	20	34.6	173
Without load	30	34.6	115
Length of fork (mm)	1,500	1,219	81
Maximum lift height of fork (mm)	4,500	4,572	102
Minimum turning radius (mm)	5,800	4,242	73
Engine horsepower	108	110	102
Number of speeds, forward/reverse	5/5	5/5	100/100
Weight (kg)	13,200	12,651	96

[1] Lift capacity at 750 millimeters load center for both models. Load center is the distance from the center of the load to the front of the rear upright of the lifting fork. The shorter the load center distance, the greater the lift capacity. The lift capacity of the US model ranges from 6,582 kilograms with a load center of 1,676 millimeters (using an optional fork) to 10,213 kilograms with a load center of 600 millimeters. Data on the range of lift capacities of the Soviet model are not available.

Function
Fork lifts of this lift capacity are used for movement and stacking/unstacking of crates and other heavy materials in and out of doors in a variety of industrial areas such as warehouses, construction sites, and port areas.

Comparability
The Soviet and US models are roughly comparable in performance. Each has certain advantages, but the US analog has overall superiority. It can lift a load faster, lift to a slightly greater height, travel faster, and work in a smaller area due to a smaller turning radius. The Soviet model can lift more and, with its longer fork, larger sized materials.

Representativeness
This item is more representative of US production. About 2,600 engine-powered fork lifts capable of lifting 6,800 kilograms or more were produced in the United States in 1972. The number produced in the USSR in 1967 is unknown but probably significantly smaller.

Hoist-Transport Equipment

Item Number 147	***Tsennik:***	6 (73); 711
Truck crane, 6.3-ton	**Rubles:**	14,540
	Dollars:	36,494
	Ruble-Dollar Ratio:	.40

Soviet Model: K-67

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum load capacity (tons)			
With outriggers	6.3	4.54	72
Without outriggers	2.0	1.45	72
Length of boom overhang, minimum/maximum (m)	3.5/7.5	3.0/10.7	86/143
Maximum lift height of hook (m)	8	11.4	142
Maximum speed of ascent at maximum load (m/min)	6.6	22.9	347
Travel speed of rotating platform (rpm)	1.62	5.0	309
Transport speed (km/hr)	75	80	107
Weight (kg)	11,900	8,940	75

Function
Truck cranes of this load capacity are used for loading/unloading work throughout industry as well as for building assembly work at construction sites.

Comparability
The Soviet and US cranes are roughly comparable in performance. The Soviet model can lift a greater weight, but in all other important respects the US analog is superior. With its faster speed of load ascent and rotation of platform, there are many applications in which the US crane in a given time, although it can lift less per load, would perform as much work as the Soviet model.

Representativeness
This item is more representative of Soviet production. Truck cranes of this type and load capacity are far more popular in the USSR than in the United States, comprising probably a major share of the 13,000 truck cranes produced in the USSR in 1967. Many truck cranes of this small load capacity produced in the United States have the crane mounted just behind the cab and are used primarily to load the truck itself (cinder blocks and bricks, for example). Only about a dozen of the particular model considered here were produced annually in the early 1970s. Available data give total truck crane production for the United States by value only.

Hoist-Transport Equipment

Item Number 148	*Tsennik:*	10 (73); 31
Bridge crane, single beam, 5-ton	**Rubles:**	2,830
	Dollars:	11,918
	Ruble-Dollar Ratio:	.24

Soviet Model: GOST 7532-64

Specifications:	USSR	US	Difference (US as percent of USSR)
Load capacity (tons)	5	4.5	90
Lifting speed (m/min)	8	7.6	95
Trolley bogie speed (m/min)	20	21.3	106
Crane speed (m/min)[1]			
With load	27	30.5	113
Without load	30	30.5	102
Crane beam length (m)	7.5	7.6	101
Weight (tons)	2.8	2.9	104

[1] Crane controlled from the floor.

Function
Bridge cranes are mounted and move on rails 6 or 7 meters above floor level in the interior of industrial buildings for handling a variety of loads.

Comparability
The Soviet and US cranes are quite comparable in performance, but the US analog may incorporate certain required safety and control features that are not on the Soviet model.

Representativeness
This item is representative of production in both countries. Bridge cranes of this load capacity are in common use in every industrial nation.

Hoist-Transport Equipment

Item Number 149	***Tsennik:***	6 (73); 745
Tracklaying crane, 25-ton	**Rubles:**	31,540
	Dollars:	75,579
	Ruble-Dollar Ratio:	.42

Soviet Model: MKG-25

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Load capacity (tons)			
At minimum radius [1]	25	25.6	102
At maximum radius [1]	5.3	3.5	66
Length of boom (m)	12.5	12.2	98
Radius of swing, load to center line (m)			
At minimum radius [1]	4	3.05	76
At maximum radius [1]	12	12.2	102
Maximum height of hook (m)	12	11.6	97
Maximum working speeds			
Load lifting (m/min)	6.03	8.6	143
Swing of platform (rpm)	.56	4.3	768
Crane travel (km/hr)	.76	1.38	182
Engine horsepower	108	106.5	99
Weight (tons)	38.0	29.9	79

[1] Radius of the arc of swing of the boom from the load hook to the center of rotation of the crane platform on which the cab is mounted.

Function

Tracklaying cranes of this load capacity are used for medium-duty loading/unloading work throughout industry as well as for building assembly work at construction sites. They can be equipped optionally to operate as draglines or backhoes or with clamshell buckets.

Comparability

The Soviet and US cranes are comparable in maximum lifting capacity, but the US analog has a distinct superiority in working speeds, apparently due to a much more highly developed system of clutches and brakes in its diesel-mechanical drive than exist in the Soviet diesel-electric drive. The greater total weight of the Soviet model explains its ability to lift more without tipping over when the boom is at its maximum radius. The greater weight itself probably can be explained by the use of heavy cast iron components. The US model uses more high-strength steels.

Representativeness

This item is more representative of US production. The USSR probably produced no more than 500 tracklaying cranes of all sizes in 1967. The United States produced only about 260 in the 18 to 32 ton load capacity category in 1972, but about 1,350 of all sizes.

Hoist-Transport Equipment

Item Number 150	***Tsennik:***	23 (72); *
Tracklaying crane, 60-ton	**Rubles:**	47,300
	Dollars:	129,540
	Ruble-Dollar Ratio:	.37
Soviet Model: E-2508		

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Load capacity with standard 15-meter boom (tons)			
At minimum radius [1]	60	70.8	118
At maximum radius [1]	13.8	8.7	63
Load capacity with 40-meter boom, 15.25-meter radius (tons)	8	7.94	99
Minimum angle of boom position from vertical (deg)	20	8.5	42
Radius of swing, load to center line (m)			
At minimum radius [1]	4.36	3.66	84
At maximum radius [1]	12	15.2	127
Maximum height of hook (m)	13.7	14.8	108
Working speeds			
Load lifting (m/min)	1.15 and 12.3	6.24	543-51
Swing of platform (rpm)	4.48	3.15	70
Crane travel (km/hr)	1.79	1.41	79
Engine horsepower	300	150	50
Weight (tons)	79	67	85

[1] Radius of the arc of swing of the boom from the load hook to the center of rotation of the crane platform on which the cab is mounted.

Function

Tracklaying cranes of this load capacity are used primarily for heavy-duty work at construction sites and secondarily for loading/unloading work throughout industry.

Comparability

The Soviet and US models are roughly comparable in performance. The US analog has a greater maximum load capacity because its boom will more closely approach the vertical where lift capability is the greatest. With the boom lowered to maximum radius, the Soviet model can lift more without tipping because it is heavier. Between these extremes—that is, a 40-meter boom, often used on cranes of this size, and a 15.25-meter radius, a typical operating position—the two cranes have the same load capacity. The Soviet crane has faster working speeds because its engine is considerably more powerful. US manufacturers, however, would consider the unit considerably overpowered for most operating situations. The unusually large engine may have been used on the Soviet model because it was a size that was readily available.

Representativeness

This item is more representative of US production. The USSR probably produced no more than 500 tracklaying cranes of all sizes in 1967. The United States produced only about 230 in the 45 to 73 ton load capacity category in 1972, but about 1,350 of all sizes.

* The *Tsennik* is not available, but a *Tsennik* 23 price was obtained from a secondary source: V. A. Padnya, *Pogruzochnorazgruzochnyye mashiny: spravochik*, third edition, "Transport," Moscow, 1972, page 115.

Hoist-Transport Equipment

Item Number 151	***Tsennik:***	16 (72); *
Gantry crane, 30-ton	**Rubles:**	24,470
	Dollars:	111,463
	Ruble-Dollar Ratio:	.22

Soviet Model: K30-32

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Load capacity (tons)	30	30	100
Lifting height of hook (m)	10.5	10.5	100
Length of travel of hook bogie (m)	28.9	28.9	100
Lifting speed (m/min)	4.85	4.85	100
Hook bogie speed (m/min)	23.5	22.86	97
Crane speed (m/min)	39	39.6	102
Weight (tons)	47.12	47.12	100

Function
Gantry cranes are used primarily for loading/unloading work in outside storage yards and servicing warehouses and plants fabricating metal structural members.

Comparability
In the United States, gantry cranes of this size are made to user specifications. Hence, the US analog is a custom-made unit that has been matched to Soviet specifications using standard US materials and design. As a result, the method of control of the hook bogie on the two units is quite different, though serving the same purpose. The Soviet model uses a traveling hook bogie, the position of which is controlled by two hoists—one winds while the other unwinds to move the hook bogie on the horizontal and one stops while the other winds or unwinds to raise or lower the hook. The US crane uses an electrically powered trolley under which the hook bogie is mounted, with the trolley moving on the horizontal under its own power and the raising and lowering of the hook controlled independently. The advantage of the US system is its greater reliability, since there is less cable to wear out.

Representativeness
This item is more representative of Soviet production. Gantry cranes have become less popular in the United States in recent years, possibly due to a lack of growth in those industries that use them the most combined with an increasing availability of more versatile substitutes such as tracklaying cranes, large fork lifts, and large front-end loaders. About 900 gantry cranes of all sizes were produced in the United States in 1972. The number produced in the USSR in 1967 is unknown but probably significantly greater.

* The *Tsennik* is not available, but a *Tsennik* 16 price was obtained from a secondary source: V. A. Padnyo, *op. cit.*, page 67.

Hoist-Transport Equipment

Item Number 152	***Tsennik:***	23 (72); *
Railroad crane, 16-ton	**Rubles:**	27,210
	Dollars:	112,495
	Ruble-Dollar Ratio:	.24

Soviet Model: KDE-161

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Load capacity (tons)			
At minimum radius[1]	16	22.7	142
At maximum radius[1]	4.9	3.36	69
At 5-meter radius[1]	16	17.5	109
Length of boom (m)	15	15.24	102
Radius of swing, load to center line (m)			
At minimum radius[1]	5	3.66	73
At maximum radius[1]	14	15.24	109
Maximum height of hook (m)	14.2	15.2	107
Working speeds			
Load lifting (m/min)[2]	8.8	11.2	127
Swing of platform (rpm)	2.0	2.5	125
Crane travel (m/min)	170	401	236
Diesel generator (hp)	115	255	222
Weight (tons)	52.1	81	155

[1] Radius of the arc of swing of the boom from the load hook to the center of rotation of the crane platform on which the cab is mounted.
[2] At maximum load.

Function

Railroad cranes, called locomotive cranes in the United States, are used by railroads for trackside maintenance work and by scrap yards and other bulk material storage yards.

Comparability

The US analog is superior to the Soviet crane in virtually every respect. It can lift more, has a greater area within which a load can be moved and, because of its greater power, has faster working speeds. The significantly greater weight of the US analog is surprising. It may be that most of its weight is in the carbody on which the crane is mounted rather than in the crane itself and its counterweights. If so, the center of gravity would be lowered, thus improving the stability of the crane, but more total weight would be required.

Representativeness

This item is more representative of Soviet production. Soviet requirements for these cranes appear to be significantly greater than those of the United States with respect to the amount of track available. In 1972, there were about 330,000 kilometers of track to be maintained in the United States compared with about 133,000 kilometers in the USSR in 1967. Yet, the USSR produced nearly 500 railroad cranes of all types in 1967 (and imported 44) compared with 60 non-wrecking-type railroad cranes produced in the United States in 1972 plus an unknown number of the wrecking type included in a small "other" category.

* The *Tsennik* is not available, but a *Tsennik* 23 price was obtained from a secondary source: V. A. Padnyo, *op. cit.*, page 103.

Hoist-Transport Equipment

Item Number 153	*Tsennik:*	10 (73); 268
Portable belt conveyor	**Rubles:**	240
	Dollars:	1,091
	Ruble-Dollar Ratio:	.22

Soviet Model: T-80

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Average productivity (m^3/hr)	27	19.4	72
Length of conveyor (m)	10	6.4	64
Width of conveying belt (mm)	400	356	89
Belt speed (m/sec)	0.8	0.72	90
Maximum conveying height (m)	3.8	3.4	89
Weight (kg)	380	544	143

Function
Portable belt conveyors are used to convey bulk and small piece goods either for stacking or piling on the same floor level as the conveyor or, through an opening, on the floor above.

Comparability
The Soviet and US conveyors are similar in function, but the Soviet unit is superior in performance. It happens to be of a size that apparently is not produced in the United States. US manufacturers seriously questioned the weight of the Soviet model. Even those US models that had less than one-half its productivity weighed more.

Representativeness
This item probably is more representative of US production. Data are not available for the USSR for 1967, but production very likely was less than the 10,000 to 12,000 portable conveyors produced in the United States in 1972.

Construction Machinery and Equipment

Item Number 154	*Tsennik:*	*
Front-end loader, wheeled	**Rubles:**	12,200
	Dollars:	19,782
	Ruble-Dollar Ratio:	.62

Soviet Model: TO-6 (D-561B)

Specifications:	USSR	US	Difference (US as percent of USSR)
Bucket capacity (m^3)[1]	1	1.14	114
Maximum bucket unloading height (mm)	2,300	2,670	116
Maximum travel speed (km/hr)			
Forward	29.0	37.45	129
Reverse	21.2	45.1	213
Wheels that control turning	Rear	Rear	—
Number of drive wheels	4	4	100
Minimum turning radius (mm)	6,300	6,480	103
Number of speeds, fwd/rev	4/2	3/3	75/150
Engine horsepower	75	80	107
Service weight (kg)	7,680	7,605	99

[1] With a general purpose bucket and with a struck load, that is, the top of the loaded material is even all the way across the top edge of the bucket. With the material heaped in the bucket, the capacity of the US model is 1.34 m^3. Comparable data are not available for the Soviet model.

Function

Front-end loaders are used in many types of construction and process work to load materials such as dirt, gravel, rocks, and other bulk items. Several optional bucket sizes generally are available to optimize loading productivity for different materials.

Comparability

The Soviet and US loaders are roughly comparable in bucket size, but the US analog is superior in overall performance. It can dump its load at a greater height and, because of its faster travel speeds, would be significantly more productive in applications in which distance was important in the loading/unloading cycle. The US loader is unique in its ability to travel faster backwards than forwards, although there appears to be no overwhelming advantage to being able to do so. Other US models either go the same speed in both directions or, like the Soviet model, go faster forward.

Representativeness

This item is more representative of US production. Data are not available for the USSR for 1967, but production probably was considerably less than the 14,400 wheeled front-end loaders produced in the United States in 1972, of which about 1,300 were in the bucket category of 1.15 m^3 or under.

* No *Tsennik* price is available. The ruble price is an enterprise wholesale price; the dollar price is f.o.b. factory. The ruble price is from S. E. Kantorer (ed.), *Raschety ekonomicheskoy effektivnosti primeneniya mashin v stroitel'stve*, Stroizdat, Moscow, 1972, page 439.

Construction Machinery and Equipment

Item Number 155	*Tsennik:*	6 (73); 948
Motor grader	**Rubles:**	14,330
	Dollars:	45,968
	Ruble-Dollar Ratio:	.31

Soviet Model: DZ-31 (D-557)

Specifications:	USSR	US	Difference (US as percent of USSR)
Blade			
Type	Fully rotating	Fully rotating	—
Dimensions (mm)			
Length	3,700	3,658	99
Height	565	610	108
Lifting height (mm)	400	440	110
Laterial movement (mm)			
Right	800	940	118
Left	800	1,035	129
Maximum depth of cut			
Below wheel level (mm)	250	451	180
Number of driving wheels	4	4	100
Number of speeds, fwd/rev	6/2	6/2	100/100
Speed range (km/hr)			
Forward	3.5-36.8	3.9-32.2	111-88
Reverse	4.0-16.5	6.6-22.0	165-133
Engine horsepower	110	125	114
Weight (kg)	12,340	12,562	102

Function

Motor graders are used primarily on roads in a variety of applications such as leveling, reworking rough surfaces, shaping, bank sloping, and snow removal.

Comparability

The Soviet and US graders are fairly close in overall performance. The advantages of the US analog are its wider range of blade movement and high horsepower. The latter, coupled with adequate weight, permits a deeper cut with each pass. The Soviet model has a faster foward movement, but this is offset on the US analog by a faster reverse that gets the unit into position more quickly for the next pass.

Representativeness

This item is more representative of US production. The US produced about 6,500 motor graders in 1972 compared with about 3,800 in the USSR in 1967.

Construction Machinery and Equipment

Item Number 156	*Tsennik:* *	
Scraper, self-propelled	**Rubles:**	72,320
	Dollars:	76,225
	Ruble-Dollar Ratio:	.95

Soviet Model: DZ-13 (D-392)

Specifications:	USSR	US	Difference (US as percent of USSR)
Bowl capacity (m^3)			
Struck [1]	15	16	107
Heaped	17.5	22.9	131
Maximum load capacity (tons)	27	32.6	121
Method of loading the bowl	Forced [2]	Forced [2]	—
Maximum working depth (mm)	350	380	109
Wheel pattern	4 x 2	4 x 2	—
Number of speeds, fwd/rev	3/1	8/1	267/100
Maximum travel speed (km/hr)			
Empty	45	51.5	114
Loaded	9	NA	—
Engine horsepower	360	415	115
Weight (tons)	30.55	35.19	115

[1] The top of the loaded material is even all the way across the top of the bowl.

[2] Dirt is forced into the bowl by the forward movement of the scraper. In an alternate design, the bowl is filled by a revolving chain elevator that picks up and paddle wheels the dirt into the bowl.

Function

Self-propelled scrapers are used extensively in earthmoving operations for the transfer of material from one area to another. Common applications include highway construction and the removal of overburden and reclaiming in mining operations.

Comparability

The Soviet and US scrapers are roughly comparable in performance based on struck bowl capacity, the basic measurement of a scraper's size. It is questionable whether the US analog really is as superior with respect to heaped bowl and maximum load capacities as the data indicate. There well may be a difference in the way the units are rated, since there seems to be no obvious reason, given only a 15-percent difference in engine power, why the heaped bowl capacity of the US analog should be 43 percent greater than the struck capacity while the difference on the Soviet model is only 17 percent. An unquestionable advantage of the US scraper, however, is its eight-speed transmission coupled with its more powerful engine. The result is a faster operating cycle and the ability to key the gear selection more closely to the varying requirements of the job.

* No *Tsennik* price is available. A *Tsennik* price was constructed from an enterprise wholesale price and the relationship between *Tsennik* and wholesale prices for other models of scrapers. See *Tsennik* 6 of the 1 January 1973 series; the wholesale prices were taken from S. E. Kantorer, *op.cit.*, pages 445-446.

Representativeness

This item is more representative of US production. The USSR produced about 7,900 scrapers of all types and sizes in 1967 compared with about 4,800 in the United States in 1972, but self-propelled units comprised only a small share of the Soviet total; the rest were tractor towed. In the United States, on the other hand, all but a few hundred of those produced were self-propelled units.

Construction Machinery and Equipment

Item Number 157	*Tsennik:*	6 (73); 937
Scraper, tractor-drawn	**Rubles:**	10,750
	Dollars:	16,620
	Ruble-Dollar Ratio:	.65

Soviet Model: DZ-12A (D-374A)

Specifications:	USSR	US	Difference (US as percent of USSR)
Bowl capacity (m^3)			
Struck [1]	6	6.34	106
Heaped	8	8.8	110
Type of control	Cable	Cable	—
Method of loading the bowl	Forced [2]	Forced [2]	—
Maximum working depth (mm)	320	609	190
Minimum turning radius (mm)	6,500	4,000	62
Engine horsepower [3]	108	Over 70	65
Weight (kg)	7,313	7,211	99

[1] The top of the loaded material is even all the way across the top of the bowl.
[2] Dirt is forced into the bowl by the forward movement of the scraper.
[3] In the case of the Soviet scraper, it is the horsepower of the tracklaying tractor for which the scraper was designed. US manufacturers do not provide this data for their tractor-drawn scrapers. The horsepower figure given is an estimate of the smallest tractor that can be used with the scraper.

Function

Tractor-drawn scrapers are used in general earth-moving applications for the transfer of material from one area to another.

Comparability

The Soviet and US scrapers are roughly comparable in performance, based on both struck and heaped bowl capacity. The US analog has a greater working depth than the Soviet model (that is, it can take a deeper cut at each pass) but a tractor at least as, or perhaps even more, powerful than that shown for the Soviet model would be required. In practice, the greater working depth probably would not be used much since in many applications a shallower working depth often fills the bowl faster and more completely. The shorter turning radius of the US analog would aid in maneuverability and have a beneficial effect on productivity.

Representativeness

This item is more representative of Soviet production. The USSR produced about 7,900 scrapers of all types and sizes in 1967, most of which were tractor drawn. The United States produced about 4,800 scrapers of all types and sizes in 1972, most of which were self-propelled.

Construction Machinery and Equipment

Item Number 158	*Tsennik:*	6 (73); 969
Motor roller, two-roller, vibratory, 1.5-ton	**Rubles:**	1,400
	Dollars:	6,080
	Ruble-Dollar Ratio:	.23
Soviet Model: D-484		

Specifications:	USSR	US	Difference (US as percent of USSR)
Weight (kg)			
Without ballast	1,350	1,670	124
With ballast	1,500	1,780	119
Width of rolled strip (mm)	730	900	123
Roller pressure without ballast (kg/cm²)			
Front	7.0	7.6	109
Rear	11.5	11.0	96
Working speeds (km/hr)			
First gear	1.8	1.46	81
Second gear	3.81	3.66	96
Amount of strip rolled per hour (m²) [1]			
First gear	1,314	1,314	100
Second gear	2,781	3,294	118
Vibratory disturbing force (kg)	2,200	2,245	102
Vibratory frequency (vib/min)	4,000	3,000	75
Minimum turning radius (mm)	2,000	3,062	153
Engine horsepower	8	12	150

[1] Theoretical, by multiplying speed by width of rolled strip.

Function

Small vibratory rollers are used to smooth and compact asphalt in a variety of applications such as sidewalk and driveway construction, parking lot paving, and street repair. They are small enough to be transported easily by trailer.

Comparability

The Soviet and US rollers are closely comparable in performance. Their respective roller pressures, their vibratory disturbing force, and the amount of strip that each theoretically can roll in an hour—the three features which combined determine a roller's compacting capability and productivity—are not greatly different. The greater speed of the Soviet unit is offset by the greater width of rolled strip of the US analog. The slower speed of the US roller, given its more powerful engine, is surprising and not readily explained.

Representativeness

This item is more representative of US production. The United States has a greater need for these small rollers than the USSR if only because of its larger area of sidewalks and parking lots. Out of a total of about 7,600 self-propelled rollers produced in the United States in 1972, about 2,200 (nearly 30 percent) were of the vibratory type. The USSR produced about 4,300 self-propelled rollers in 1967. The share of the vibratory type is unknown, but it would have to equal about one-half to match US production and that is highly unlikely.

Construction Machinery and Equipment

Item Number 159	*Tsennik:*	23 (72); *
Motor-roller, three-roller, 13-ton	**Rubles:**	6,250
	Dollars:	19,461
	Ruble-Dollar Ratio:	.32

Soviet Model: DU-18 (D-553)

Specifications:	USSR	US	Difference (US as percent of USSR)
Weight (kg)			
Without ballast	10,000	10,914	109
With ballast	13,000	13,231	102
Width of rolled strip (mm)	1,800	1,930	107
Roller pressure (kg/cm²)			
Without ballast			
Front	30	25.05	84
Rear	73	77.79	107
With ballast			
Front	43	33.64	78
Rear	86	90.75	106
Maximum working speeds (km/hr)			
First gear	3.8	NA	—
Second gear	7.5	8.85	118
Amount of strip rolled per hour (m²) [1]			
First gear	6,840	NA	—
Second gear	13,500	17,080	127
Turning radius along outer track (mm)	5,400	5,791	107
Engine horsepower	50	96	192

[1] Theoretical, by multiplying speed by width of rolled strip.

Function

Static (as opposed to vibratory) steel-wheeled rollers of this size are used extensively in all types of paving operations to smooth and compact asphalt and other materials.

Comparability

The Soviet and US rollers are roughly comparable in performance. They weigh about the same, have about the same roller pressure, and can turn around in about the same area. However, the US analog, with its combination of wider rollers and a more powerful engine for greater speed, theoretically will roll a greater area in a given time than the Soviet model.

Representativeness

This item is more representative of US production. Out of a total of about 7,600 self-propelled rollers produced in the United States in 1972, about 700 (9 percent) were in the category of heavy-duty units of 7.25 tons and over. The USSR produced about 4,300 self-propelled rollers in 1967. The share of heavy-duty units is unknown but is unlikely to have been larger than that for the United States.

* The *Tsennik* is not available, but a *Tsennik* 23 price was obtained from a secondary source: A. K. Reysh, S. M. Borisov, B. F. Bandakov, Yu. B. Deynego, V. A. Ivanov, *Spravochnoye posobiye po stroitel'nym mashinam, vypusk 2: mashiny dlya zemlyanykh rabot,* Stroizdat, Moscow, 1974, page 265.

Construction Machinery and Equipment

Item Number 160	*Tsennik:*	6 (73); 566
Excavator, single-bucket, tracked	**Rubles:**	12,940
	Dollars:	50,599
	Ruble-Dollar Ratio:	.26
Soviet Model: E-652A		

Specifications:	USSR	US	Difference (US as percent of USSR)
Designed productivity (m^3/hr)	106	NA	—
Bucket capacity (m^3)	0.65	0.57	88
Swing of platform (rpm)	3.5 and 6.0	4.2	120 and 70
Radius of excavation (m)	7.8	8.15	104
Travel speed (km/hr)	1.8 and 3.1	1.9	106 and 61
Engine horsepower	82	84	102
Weight (tons)	21.2	21.6	102

Function

Single-bucket excavators of this size are used for medium-scale excavating and loading work in a variety of applications at construction sites, quarries, and the like.

Comparability

In actual use the Soviet and US excavators would perform about the same. The US analog has a slightly smaller bucket, but its greater radius of excavation would require less frequent shifts of position, which, in turn, also partially offsets the Soviet model's greater travel speed.

Representativeness

This item is more representative of Soviet production. In 1967, the USSR produced 23,600 single-bucket excavators of all sizes, about 4,700 of which had buckets in the category of 0.35 to 0.8 m^3. In 1972, the United States produced about 4,200 single-bucket excavators of all sizes, only a few dozen of which had buckets in the aforementioned category.

Construction Machinery and Equipment

Item Number 161	*Tsennik:*	6 (73); 596
Excavator, single-bucket, tracked	**Rubles:**	22,190
	Dollars:	111,283
	Ruble-Dollar Ratio:	.20

Soviet Model: E-1252B

Specifications:	USSR	US	Difference (US as percent of USSR)
Bucket capacity (m^3)	1.25	1.15	92
Swing of platform (rpm)	4.75	3.7	78
Radius of excavation (m)[1]	9.9	9.98	101
Maximum unloading height (m)[1]	5.1	5.13	101
Travel speed (km/hr)	1.5	1.44	96
Engine horsepower	130	165	127
Weight (tons)[2]	42.0	46.7	111

[1] With boom angle at an inclination of 45°.
[2] With a straight bucket, that is, a bucket that loads at the front and dumps at the rear.

Function
Single-bucket excavators of this size are used for medium-scale excavating and loading work in a variety of applications at construction sites, quarries, open pit mining, and the like.

Comparability
In actual use the Soviet and US excavators would perform about the same even though the bucket of the US analog is slightly smaller. US manufacturers felt that the Soviet model was underpowered for the size of its bucket, based on US practice. In fact, when the optional 1.34 m^3 bucket (only 7 percent larger than the Soviet) is used on the US analog, an engine of about 238 horsepower is installed. Greater power is considered necessary so that the unit can maintain its performance even under the most difficult digging conditions.

Representativeness
This item is more representative of Soviet production. In 1967, the USSR produced 23,600 single-bucket excavators of all sizes, about 1,900 of which had buckets in the category of 1.0 to 1.25 m^3. In 1972, the United States produced about 4,200 single-bucket excavators of all sizes, only a few dozen of which had buckets in the aforementioned category.

Construction Machinery and Equipment

Item Number 162	*Tsennik:*	6 (73); 700
Excavator, trenching	**Rubles:**	9,590
	Dollars:	35,562
	Ruble-Dollar Ratio:	.27

Soviet Model: ETU-354A

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum depth of trench (m)	3.5	3.35	96
Maximum width of trench (cm)[1]	80	76	95
Maximum forward movement of trenching (m/min)	1.92	3.75	195
Number of speeds for forward movement	8	30	375
Maximum bucket-line speed (m/min)	66	69	105
Engine horsepower	60	81	135
Weight (tons)	12.26	7.78	63

[1] At the bottom of the trench.

Function
Trenching excavators are used to dig trenches for the burying of tile or cable.

Comparability
The US excavator is more productive than the Soviet model. It digs a slightly smaller trench, but its trenching speed is almost double that of the Soviet, due primarily to a more powerful engine coupled with considerably less weight. With 30 different speeds for forward movement rather than the eight of the Soviet model, the US analog also has superior capabilities in adjusting the rate of trenching to the particular conditions of the soil.

Representativeness
This item is more representative of US production. In 1972, the United States produced about 10,700 trenching excavators, about 10,100 of which had a ladder-type trenching system. The USSR produced only about 2,300 multibucket excavators of all types and sizes (including ladder-type trenchers) in 1967.

Construction Machinery and Equipment

Item Number 163	*Tsennik:*	6 (73); 822
Stump remover, tractor-mounted	**Rubles:**	465
	Dollars:	2,113
	Ruble-Dollar Ratio:	.22

Soviet Model: DP-3 (D-513A)

Specifications:	USSR	US	Difference (US as percent of USSR)
Width of blade (mm)	1,540	3,100[1]	—
Number of teeth	4	5	125
Width of grab (mm)[2]	1,380	1,473	107
Maximum depth teeth can be submerged (mm)	400	406	102
Tracklaying tractor used (hp)	108	105	97
Weight (without tractor) (kg)	1,300	1,030	79

[1] Blade is a standard width of 3,100 millimeters but can be equipped with from five to nine teeth depending upon the requirements of the buyer. Five teeth, however, would not be spread over the full span of the blade since to do so would leave too large a gap between teeth.
[2] With the number of teeth indicated for each model.

Function
Stump removers, mounted on the front of the tractor like a bulldozer blade, are used to remove stumps and large rocks in land clearing operations.

Comparability
The Soviet and US stump removers are closely comparable in performance in that they have about the same power, width of grab, and distance that teeth can be submerged. The difference in the number of teeth would not be significant in most applications.

Representativeness
The representativeness of this item is uncertain for lack of production data. There probably are a great many of them used in both countries.

Construction Machinery and Equipment

Item Number 164	*Tsennik:*	6 (73); 856
Ripper, tractor-mounted	**Rubles:**	2,270
	Dollars:	5,262
	Ruble-Dollar Ratio:	.43

Soviet Model: D-515A

Specifications:	USSR	US	Difference (US as percent of USSR)
Material ripped per hour (thousand m³)[1]	10.78	12.42	115
Width of ripped strip (m)	1.9	2.34	123
Depth of penetration (mm)	560	478	85
Maximum travel speeds (km/hr)			
Forward	10.13	11.1	110
Reverse	7.61	10.1	133
Number of ripping shanks	3	3	100
Tracklaying tractor used (hp)	108	105	97
Weight (without tractor) (kg)	1,550	1,497	97

[1] Theoretical, by multiplying width of ripped strip by depth of penetration by maximum forward speed.

Function

Tractor-mounted rippers of this size typically are used in mining and construction work to penetrate and loosen materials such as rock, shale, and compacted or frozen soil for removal by other equipment.

Comparability

With a theoretical productivity 15 percent above that of the Soviet model, the US analog probably would rip up more ground under any conditions. Moreover, the analog is of the "parallelogram type" rather than the "hinged type" like the Soviet model. The advantage is that the shanks are maintained in a more constant penetration angle, particularly when ripping at less than maximum depth. The advantage of the Soviet model is that it can rip to a greater depth. Maximum ripping depth could only be used in soil that was not frozen or heavily stone infested, but when feasible to use, it would mean fewer passes to complete a job.

Representativeness

This item is more representative of US production. About 5,400 rippers of all sizes were produced in the United States in 1972. Production in the USSR in 1967 is unknown, but about 2,300 units were produced in 1966 with about 3,700 units planned by 1971.

Construction Machinery and Equipment

Item Number 165	*Tsennik:*	6 (73); 977
Asphalt laying machine	**Rubles:**	8,440
	Dollars:	28,627
	Ruble-Dollar Ratio:	.29

Soviet Model: D-150A

Specifications:	USSR	US	Difference (US as percent of USSR)
Amount of asphalt laid			
Square meters per minute [1]	119.0	120.8	102
Cubic meters per minute [2]	17.85	24.52	137
Type	Tracked	Wheeled	—
Maximum width of asphalted strip (mm)	3,500	3,962	113
Maximum thickness of asphalt laid (mm)	150	203	135
Maximum working speeds (m/min)			
Forward	34	30.5	90
Backward	34	26.4	78
Capacity of level asphalt bunker (kg)	4,500	8,165	181
Transport speed (km/hr)	2	16.1	805
Engine horsepower	40	59	148
Weight (kg)	12,000	7,664	64

[1] Theoretical, by multiplying the width of the asphalted strip by the maximum forward speed.
[2] Theoretical, by multiplying the width of the asphalted strip by the maximum forward speed by the thickness of the asphalt laid.

Function
Asphalt laying machines, whether tracked or wheeled, are used for paving or resurfacing areas such as highways, streets, and parking lots.

Comparability
The Soviet and US machines have about the same productivity in terms of the square meters of asphalt that can be laid in a given time. The US analog, however, with its larger bunker, can maintain operations longer without being resupplied with new asphalt and can, when necessary, also lay down a thicker surface with each pass. The difference in weight and transport speed is largely explained by the heavy track system under the Soviet model while the analog is on wheels. The Soviet machine is believed to have been copied from a US model that was discontinued in the late 1950s. Infinitely variable speed with hydrostatic drive has been incorporated into the particular US machine considered here. The Soviet machine still has the old mechanical drive.

Representativeness
This item is more representative of US production. The US produced about 800 asphalt laying machines of all sizes in 1972 compared with about 200 in the USSR in 1967.

Construction Machinery and Equipment

Item Number 166	*Tsennik:*	6 (73); 979
Cement mixer, portable	**Rubles:**	147
	Dollars:	216
	Ruble-Dollar Ratio:	.68

Soviet Model: S-674A

Specifications:	USSR	US	Difference (US as percent of USSR)
Productivity (ltrs/hr)	1,800[1]	NA	—
Capacity of drum (ltrs)	100	127	127
Capacity of finished cement (ltrs)	65	71	109
Power of electric motor (kW)	0.6	0.37	62
Weight (kg)	230	91	40

[1] Obviously a theoretical productivity rate since a batch of finished cement about every 2.2 minutes is indicated.

Function

Portable cement mixers of this size are used in construction projects where either the quantities of cement needed are too small or the location too remote or difficult of access to make large mixers or ready-mix truck deliveries practical.

Comparability

Despite its lighter weight and smaller motor, the US analog probably is more productive than the Soviet model. Although actual productivity is not given for the analog, it clearly makes more finished cement per batch and presumably could make each batch about as quickly. However, in practice, neither unit could produce finished cement on a continuing basis at the rate ascribed to the Soviet model. The Soviet mixer is unusually heavy considering the smallness of its drum relative to the US analog. The weight apparently is in a very heavy frame and base which would permit rugged, abusive use.

Representativeness

This item is more representative of US production. The United States produced about 35,000 small, portable mixers in 1972, including an unknown number of hand-operated units. The USSR produced 23,000 cement mixers in 1967, but the share of small, portable units of the total is unknown.

Construction Materials Machinery and Equipment

Item Number 167	*Tsennik:*	6 (73); 1,127
Jaw crusher	**Rubles:**	3,160
	Dollars:	18,029
	Ruble-Dollar Ratio:	.18

Soviet Model: SM-11B

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum size of stone that can be crushed (mm)	340	Similar	100
Size of loading opening (mm)	400 x 600	380 x 610	97
Size of discharge opening (mm)	40 x 100	38 x 127	121
Power of electric motor (kW)	28	29.8	106
Weight (kg)	6,450	5,797	90

Function
Jaw crushers are used to break up large rocks to produce material for roadbeds, foundations, and similar construction uses.

Comparability
The Soviet and US models are well matched. They will crush stone to the same maximum size and, with about the same power, should be able to do it at about the same rate.

Representativeness
This item probably is representative of production in both countries.

Transportation Equipment
(Locomotives)

Item Number 168	*Tsennik:*	100 (72); *
Railroad passenger locomotive (diesel-electric)	**Rubles:**	255,120
	Dollars:	202,075
	Ruble-Dollar Ratio:	1.26

Soviet Model: TEP-60

Specifications:	USSR	US	Difference (US as percent of USSR)
Tractive effort[1] (kg at 50 km/hr)	12,500	14,500	116
Rated power of diesel engine (hp and rpm)	3,000 (750)	3,000 (900)	100
Rated power of traction motor (kW)	307	407	133
Maximum power on wheel rims (hp)	2,380	2,827	119
Design speed (km/hr)	160	114-133	71-83
Fuel consumption (grams/brake hp/hr)	170-175	163	96-93
Number of sections	1	1	—
Total weight per section in working order (kg)	126,000	116,121	92

[1] Measures the ability of a locomotive to accelerate a load at a given speed and a general indicator of the ability to start a load.

Function
These locomotives are used to pull passenger trains. A diesel engine drives a generator that, in turn, drives electric motors geared to the axles.

Comparability
The Soviet and US locomotives differ mainly in weight, tractive effort, and design speed. The Soviet model is heavier with less tractive effort but has greater design speed. This implies that it is geared to pull a lighter train at a higher speed than the US model. Conversely, the US analog can pull a heavier train. These characteristics reflect the different end-use patterns and requirements of the respective economies. The Soviet model is of older design than the US analog, having been in continuous production in the USSR, without major design changes, since 1960; hence, its greater weight.

* *Tsennik* 100 is not available, but a *Tsennik* 100 price was obtained from a secondary source: *Instruktsiya po opredeleniyu ekonomicheskoy effektivnostikapital'nykh vlozheniy na zheleznodorozhnom transporte,* Transport, Moscow, 1973, page 21.

Representativeness
This item is representative of production in both countries. The United States produced about 1,500 diesel-electric locomotives in 1972, and the USSR produced about the same number in 1967. In addition, the particular Soviet and US models considered here also were produced in the same quantity—about 50 units.

Transportation Equipment
(Locomotives)

Item Number 169	*Tsennik:*	100 (72);*
Railroad freight locomotive (diesel-electric)	**Rubles:**	228,900
	Dollars:	379,907
	Ruble-Dollar Ratio:	.60

Soviet Model: TE-3

Specifications:	USSR	US	Difference (US as percent of USSR)
Tractive effort[1] (kg at 20 km/hr)	43,200	43,545	101
Rated power of diesel engine (hp and rpm)	2,000 (850)	1,800 (1,050)	90
Rated power of traction motor (kW)	206	670	325
Maximum power on wheel rims (hp)	3,140	3,060	97
Design speed (km/hr)	100	112-150	112-150
Fuel consumption (grams/brake hp/hr)	170-175	163	96-93
Number of sections	2	2	—
Total weight per section in working order (kg)	126,000	103,420	82

[1] Measures the ability of a locomotive to accelerate a load at a given speed and a general indicator of the ability to start a load.

Function
These locomotives are used to pull freight trains. A diesel engine drives a generator that, in turn, drives electric motors geared to the axles.

Comparability
The Soviet and US locomotives are closely matched in their ability to start and move freight trains. They have similar tractive effort at the wheels at low speed where tractive effort is important for a freight locomotive. The US analog has great power in its traction motor, but its lighter weight on the four driving axles of each section limits its tractive effort. The Soviet model has excess power in its diesel engine, but its tractive effort is limited by the low power of its traction motor that drives the six axles on each section. The US locomotive probably would be the more economical to operate because it is less complex and gets its traction from a smaller engine with better specific fuel consumption.

Representativeness
This item is more representative of Soviet production. By 1967, the Soviet model had been in continuous production since 1953 without any major design changes. Several hundred units were produced in 1967 compared with about 10 units of the US analog in 1972.

* *Tsennik* 100 is not available, but a *Tsennik* 100 price was obtained from a secondary source: Instruktsiya, *op. cit.*, page 21.

Transportation Equipment
(Locomotives)

Item Number 170	***Tsennik:***	100 (72);*
Railroad freight locomotive (electric)	**Rubles:**	281,450
	Dollars:	502,966
	Ruble-Dollar Ratio:	.56

Soviet Model: VL-80K

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Current	AC	AC	—
Tractive effort[1] (kg at indicated km/hr)			
Continuous rating	45,100 at 53.6	27,216 at 53	60
Power of tractive motors (kW)			
Continuous rating [2]	6,160	3,800	62
Number of motors/kW each	8/815	6/670	75/82
Maximum speed (km/hr)	110	116	105
Number of sections	2	1	—
Weight (kg)	184,000	190,000	103
Weight to power ratio (kg/kW)	29.9	50.0	167

[1] Measures the ability of a locomotive to accelerate a load at a given speed and a general indicator of the ability to start a load.
[2] The continuous rating is 94 percent of total power for the Soviet model and 95 percent for the US model.

Function
These locomotives are used to pull freight trains.

Comparability
There is no close US analog for the Soviet model, which is equal in tractive effort to about one and two-thirds locomotives of the type selected as an analog. The Soviet locomotive is a two-section model with both sections always operating together. The US analog provides greater versatility because it can operate as a single unit or in multiples of two or more depending upon the train weight and speed desired.

Representativeness
This item is more representative of Soviet production. Soviet output reached the level of about 100 units in 1967. About 10 units of the US model were produced in 1972.

* *Tsennik* 100 is not available, but a *Tsennik* 100 price was obtained from a secondary source: Instruktsiya, *op. cit.*, page 22.

Transportation Equipment
(Freight Cars)

Item Number 171	*Tsennik:*	100 (72);*
Railroad boxcar, four-axle	**Rubles:**	7,440
	Dollars:	17,090
	Ruble-Dollar Ratio:	.44

Soviet Model: No model number

Specifications:	USSR	US	Difference (US as percent of USSR)
Maximum design speed (km/hr)	120	121	101
Empty weight (tons)	22 [1]	24.5	111
Floor area (m^2)	37	35.7	96
Volume (m^3)	120	116.6	97
Capacity (tons)	62	63.5	102
Wheel base (mm)	10,000	11,811	118

[1] Plus or minus 3 percent.

Function
Boxcars are totally enclosed containers used to carry cargo that may need protection.

Comparability
These models differ slightly in weight and size due to different wheel bases. The US model is slightly heavier because its floor, top, and sides are made of metal versus wood on the Soviet model.

* *Tsennik* 100 is not available, but a *Tsennik* 100 price was obtained from a secondary source: Instruktsiya, *op. cit.*, page 19.

Representativeness
This item is representative of production in both countries. The Soviet model is produced on a large scale in a small number of very large plants. Boxcars are manufactured in large quantities in both countries, probably representing roughly equal shares of freight car production. In 1967, the USSR produced about 44,000 freight cars of all types compared with about 48,000 in the United States in 1972.

Transportation Equipment
(Freight Cars)

Item Number 172	***Tsennik:***	100 (72);*
Railroad tank car, four-axle	**Rubles:**	6,970
	Dollars:	15,470
	Ruble-Dollar Ratio:	.45

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (tons)	60	63.52	106
Empty weight (tons)	22.8	23.13	101
Volume (m^3)	61.2	74.22	121
Designed speed (km/hr)	120	120	100

Function
Tank cars are used to transport liquid cargo.

Comparability
The Soviet and US models are quite similar but differ in the volume and weight of cargo they can carry. The US analog can carry about a 20 percent greater volume of liquid if it is of light weight (low specific gravity) without exceeding the car's hauling capacity in tons.

Representativeness
This item is more representative of Soviet production. Both countries build a similar quantity of tank cars, but the Soviet model in this particular size is produced in considerably larger quantities than the US produces in the US analog size. Most tank cars in the United States have capacities of 90 tons or more.

* *Tsennik* 100 is not available, but a *Tsennik* 100 price was obtained from a secondary source: Instruktsiya, *op. cit.*, page 19.

Transportation Equipment
(Freight Cars)

Item Number 173	*Tsennik:*	100 (72);*
Railroad gondola car, four-axle	**Rubles:**	5,700
	Dollars:	15,301
	Ruble-Dollar Ratio:	.37

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Capacity (tons)	63	63.5	101
Empty weight (tons)	25.4	27.67	109
Volume (m^3)	70.5	63.50	90
Designed speed (km/hr)	120	120	100

Function
Gondolas are roofless cars that transport bulk goods such as coal, gravel, and rocks.

Comparability
Both models are very similar in hauling capacity and only about 10 percent apart in empty weight and volume. The US analog is slightly heavier, but both are designed for the same speed. The Soviet model has a slightly larger volume which may be attributed to higher walls.

Representativeness
This item is more representative of Soviet production. Although gondolas are produced in similar quantities in both countries, the United States does not produce many 63-ton models. The 90-ton models are favored instead.

* *Tsennik* 100 is not available, but a *Tsennik* 100 price was obtained from a secondary source: Instruktsiya, *op. cit.*, page 19.

Transportation Equipment
(Merchant Ships) [1]

Item Number 174	***Tsennik:***	None
Dry cargo merchant ship	**Rubles:**	6,840,000
	Dollars:	12,770,000
	Ruble-Dollar Ratio:	.54

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	3,460	3,460	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 175	***Tsennik:***	None
Dry cargo merchant ship	**Rubles:**	6,870,000
	Dollars:	14,820,000
	Ruble-Dollar Ratio:	.46

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	3,760	3,760	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 176	***Tsennik:***	None
Dry cargo merchant ship	**Rubles:**	8,300,000
	Dollars:	17,110,000
	Ruble-Dollar Ratio:	.49

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	4,270	4,270	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 177	***Tsennik:***	None
Dry cargo merchant ship	**Rubles:**	11,650,000
	Dollars:	26,370,000
	Ruble-Dollar Ratio:	.44

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	7,150	7,150	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 178	*Tsennik:*	None
Bulk cargo merchant ship	**Rubles:**	14,910,000
	Dollars:	26,190,000
	Ruble-Dollar Ratio:	.57

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	11,200	11,200	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 179	***Tsennik:***	None
Tanker	**Rubles:**	9,600,000
	Dollars:	19,800,000
	Ruble-Dollar Ratio:	.48

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	4,860	4,860	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 180	*Tsennik:*	None
Tanker	**Rubles:**	12,600,000
	Dollars:	24,520,000
	Ruble-Dollar Ratio:	.51

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	8,100	8,100	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of Cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 181	***Tsennik:***	None
Tanker	**Rubles:**	14,770,000
	Dollars:	29,930,000
	Ruble-Dollar Ratio:	.49

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	12,000	12,000	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of cargo.

Transportation Equipment
(Merchant Ships) [1]

Item Number 182	*Tsennik:*	None
Tanker	**Rubles:**	31,130,000
	Dollars:	53,780,000
	Ruble-Dollar Ratio:	.58

Soviet Model: No model number

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Light displacement (tons) [2]	30,200	30,200	100

[1] The descriptive and price data for merchant ships are from unpublished sources.
[2] Net of Cargo.

Automobiles
(Trucks)

Item Number 183	***Tsennik:***	110 (72); 1
Platform truck, 4 x 2	**Rubles:**	1,640
	Dollars:	2,976
	Ruble-Dollar Ratio:	.55

Soviet Model: UAZ-451DM

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Cargo capacity (kg)	1,000	1,119	112
Cargo platform area (m^2)	4.86	4.46	92
Gross vehicle weight (kg)	2,510	2,744	109
Engine type	Gasoline	Gasoline	—
Number of cylinders	4	6	150
Engine power			
hp	75	100	133
at rpm	4,000	3,600	90
Maximum torque			
kgm	17	24	141
at rpm	2,000	1,600	80
Maximum speed, full load (km/hr)	100	113	113
Fuel consumption (ltrs/100 km)	12	14.7	122
Travel distance without refueling (km)	465	541	116

Function
These are general-purpose, light-cargo-carrying "pick-up" type vehicles. They can be used with or without sides. They are used mainly for intraurban transport.

Comparability
The Soviet model is a smaller, less powerful vehicle than the US analog. Nevertheless, it carries nearly as much cargo in weight and slightly more in bulk (8 percent greater cargo platform area). The Soviet model can travel nearly as fast as the US model at maximum speed, travels almost as far without refueling, and consumes substantially less fuel. In addition, the Soviet vehicle can ford a stream three-quarters of a meter in depth—a capability the US analog does not have. The Soviet vehicle has relatively less acceleration and would be less effective than the US model in hilly terrain. The average speed would be lower for the Soviet truck because it is underpowered compared to the US analog.

Representativeness
This item is more representative of US production. The Soviet model is the only model produced in the USSR in the given weight class; it represented about 5 percent of total Soviet truck production in 1967. The US model in 1972 was 2 percent of US truck production, but its weight and type of vehicle represented 43 percent of US truck output.

Automobiles
(Trucks)

Item Number 184	***Tsennik:***	110 (72); 17
Platform truck, 4 x 4	**Rubles:**	3,590
	Dollars:	6,360
	Ruble-Dollar Ratio:	.56

Soviet Model: GAZ-66

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Cargo capacity (kg)	2,000	2,087	104
Cargo platform area (m^2)	6.83	6.83	100
Gross vehicle weight (kg)	5,470	4,990	91
Engine type	Gasoline	Gasoline	—
Number of cylinders	8	8	100
Engine power			
hp	115	186	162
at rpm	3,200	3,900	122
Maximum torque			
kgm	29	43.7	151
at rpm	2,300	2,200	96
Maximum speed, full load (km/hr)	90	97	108
Fuel consumption (ltrs/100 km)	24	29.4	122
Travel distance without refueling (km)	875	309	35

Function
These are all-terrain, cargo-carrying vehicles used in agriculture, construction, and for military transport.

Comparability
The Soviet model is a heavier, less powerful, vehicle with a cruising range two and a half times the US analog because it has two fuel tanks. The US analog can outperform the Soviet model on the highway and in hilly terrain because of its higher horsepower and torque, but it would run out of fuel sooner. The Soviet vehicle, designed primarily for military use and rugged civilian use, has capabilities that the US analog does not have such as control of tire pressure from the cab and the ability to ford streams higher than the truck axle.

Representativeness
This item is more representative of Soviet production. The Soviet model holds a larger share of truck production in the USSR than does the US analog in the United States, mainly because the Soviet model is widely used by the military. In 1972 the US model represented less than 1 percent of the total US truck production.

Automobiles
(Trucks)

Item Number 185	***Tsennik:***	110 (72); 14
Platform truck, 4 x 2	**Rubles:**	2,700
	Dollars:	6,093
	Ruble-Dollar Ratio:	.44

Soviet Model: GAZ-53A

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Cargo capacity (kg)	4,000	3,600	90
Cargo platform area (m^2)	8.14	8.14	100
Gross vehicle weight (kg)	7,250	6,800	94
Engine type	Gasoline	Gasoline	—
Number of cylinders	8	6	75
Engine power			
hp	115	140	122
at rpm	3,200	3,900	122
Maximum torque			
kgm	28	30	107
at rpm	2,000	1,600	80
Maximum speed, full load (km/hr)	80	100	125
Fuel consumption (ltrs/100 km)	24	24	100
Travel distance without refueling (km)	375	380	101

Function
These are general-purpose, cargo-carrying highway vehicles that can be used by all economic sectors and for military transport.

Comparability
The Soviet model is an underpowered, heavier, and slower vehicle. Its eight-cylinder engine is about 20 percent weaker than the US analog's six-cylinder engine, mainly because it was designed to burn a lower octane fuel than its counterpart. Both trucks can carry the same weight and amount of cargo over the same distance with equal fuel expenditure.

Representativeness
This item is more representative of Soviet production, accounting for about 18 percent of total truck production in 1967 while the US model represented less than 2 percent of truck production in 1972.

Automobiles
(Trucks)

Item Number 186	*Tsennik:*	110 (72); 27
Platform truck, 4 x 2	**Rubles:**	3,140
	Dollars:	8,037
	Ruble Dollar Ratio:	.39

Soviet Model: ZIL-130

Specifications:	USSR	US	Difference (US as percent of USSR)
Cargo capacity (kg)	5,000	5,832	117
Cargo platform area (m^2)	8.73	8.73	100
Gross vehicle weight (kg)	9,300	9,528	102
Engine type	Gasoline	Gasoline	—
Number of cylinders	8	8	100
Engine power			
hp	150	155	103
at rpm	3,100	4,000	129
Maximum torque			
kgm	41	37	90
at rpm	1,800	2,400	133
Maximum speed, full load (km/hr)	90	100	111
Fuel consumption (ltrs/100 km)	28	34	121
Travel distance without refueling (km)	600	235	39

Function
These are general-purpose, cargo-carrying highway vehicles used by all sectors of the economy.

Comparability
The Soviet and US models are well matched, thanks to the ability of US manufacturers to tailor their trucks to satisfy a variety of performance requirements. The power, cargo capacity, and fuel consumption are not greatly different, although the Soviet model could go farther without refueling. Because the Soviet truck has more dead weight as a percentage of gross vehicle weight, theoretically it will burn a little more fuel per ton-kilometer of cargo hauled than the US analog.

Representativeness
This item is more representative of Soviet production, accounting for approximately 15 percent of total truck production in 1967. The US model represented only about 2 percent of the US market in 1972. Both models are produced in roughly equal number.

Automobiles
(Trucks)

Item Number 187	*Tsennik:*	110 (72); 35
Platform truck, 6 x 6	**Rubles:**	6,290
	Dollars:	16,395
	Ruble-Dollar Ratio:	.38

Soviet Model: ZIL-131

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Cargo capacity (kg)	5,000	4,535	91
Cargo platform area (m^2)	8.34	8.14	98
Gross vehicle weight (kg)	11,460	10,444	91
Engine type	Gasoline	Diesel	—
Number of cylinders	8	8	100
Engine power			
hp	150	142	95
at rpm	3,200	2,600	81
Maximum torque			
kgm	41	47	115
at rpm	1,800	1,400	78
Maximum speed, full load (km/hr)	80	88.5	111
Fuel consumption (ltrs/100 km)	40	39.1	98
Travel distance without refueling (km)	850	484	57

Function
These are all-terrain, cargo-carrying vehicles, used in agriculture and construction and for military transport.

Comparability
Both models are quite similar in weight, cargo capacity, and engine performance. The US analog has a diesel engine, which accounts for the engine's larger size, higher torque capability, and slightly lower horsepower. The Soviet model has a much longer cruising range due to its larger fuel tank; this reflects a design intended to serve a military role. The US analog, also primarily used by the military, does not have a large fuel tank nor control of tire pressure from the cab; it does have a multifuel capability which the Soviet model does not have.

Representativeness
This item is more representative of Soviet production, accounting for about 4 percent of total truck production in 1967 compared with less than 1 percent for the US model in 1972. The USSR produces large numbers of 6 x 6 trucks of this cargo capacity for the military and civilian economies. They are required because of the poor road system. The United States produces them only for the military. Both the US and Soviet trucks cost more than the trucks of the same cargo capacity with conventional drive for use on improved roads.

Automobiles
(Trucks)

Item Number 188	***Tsennik:***	110 (72); 37
Platform truck, 6 x 6	**Rubles:**	9,140
	Dollars:	31,482
	Ruble-Dollar Ratio:	.29

Soviet Model: URAL-375D

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Cargo capacity (kg)	7,500	8,165	109
Cargo platform area (m^2)	9.48	9.48	100
Gross vehicle weight (kg)	15,500	14,969	97
Engine type	Gasoline	Gasoline	—
Number of cylinders	8	8	100
Engine power			
hp	180	199	111
at rpm	3,200	3,800	119
Maximum torque			
kgm	47.5	51.4	108
at rpm	1,800	2,100	117
Maximum speed, full load (km/hr)	75	80	107
Fuel tank capacity (ltrs)[1]	300	189	63

[1] Fuel consumption and travel distance without refueling were not given for the US analog.

Function
These are all-terrain vehicles used by the military and, to a lesser extent, in construction and agriculture.

Comparability
Both models are quite similar in weight, cargo capacity, engine performance, and top speed. The Soviet model has a much larger fuel tank, which gives it a greater cruising range. Unlike the US analog, the Soviet vehicle has tire pressure control from the cab but does not have dual wheels on the rear axles like the US model.

Representativeness
This item is more representative of Soviet production, accounting for about 3 percent of total truck production in 1967. This type of truck (6 x 6) is produced in far greater quantity in the USSR than in the United States because of the preponderance of unpaved roads in the USSR.

Automobiles
(Trucks)

Item Number 189	*Tsennik:*	110 (72); 41
Platform truck, 4 x 2	**Rubles:**	5,860
	Dollars:	14,595
	Ruble-Dollar Ratio:	.40

Soviet Model: MAZ-500

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Cargo capacity (kg)	7,500	7,648	102
Cargo platform area (m^2)	11.43	11.43	100
Gross vehicle weight (kg)	14,000	12,477	89
Engine type	Diesel	Diesel	—
Number of cylinders	6	6	100
Engine power			
hp	180	190	106
at rpm	2,100	2,800	133
Maximum torque			
kgm	68	57.3	84
at rpm	1,500	1,800	120
Maximum speed, full load (km/hr)	75	111	148
Fuel consumption (ltrs/100 km)	22	25	114
Travel distance without refueling (km)	900	968	108

Function
These are general-purposed, heavy-duty cargo-carrying highway vehicles used in all sectors of the economy.

Comparability
The Soviet and US trucks are well matched in function and performance, although the Soviet model has a cab-over-engine while the analog has the conventional cab used on this type of truck in US practice. The US truck is capable of higher speeds and steeper grades because it has less dead weight and, therefore, less gross vehicle weight for about the same payload. This capability is enhanced by the two-speed rear axle which gives the analog 10 speeds rather than the five of the Soviet truck. The greater range of speeds gives the analog the advantage in choosing the most economical speed for varying highway and load conditions.

Representativeness
This item is representative of production in both countries in the given weight class, although the United States produced about four times as many trucks in this weight class in 1972 as the USSR did in 1967.

Automobiles
(Trucks)

Item Number 190	***Tsennik:***	110 (72); 46
Platform truck, 6 x 4	**Rubles:**	8,320
	Dollars:	25,532
	Ruble-Dollar Ratio:	.33

Soviet Model: KrAZ-257

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Cargo capacity (tons)	12	14.9	124
Cargo platform area (m^2)	14.31	14.31	100
Gross vehicle weight (kg)	23,130	22,900	99
Engine type	Diesel	Diesel	—
Number of cylinders	8	8	100
Engine power			
hp	240	242	101
at rpm	2,100	2,100	100
Maximum torque			
kgm	87	96	110
at rpm	1,500	1,200	80
Maximum speed, full load (km/hr)	60	80	133
Fuel consumption (ltrs/100 km)	45	47	104
Travel distance without refueling (km)	1,000	805	80

Function
These are heavy-duty highway cargo-carrying vehicles used by most sectors of the economy.

Comparability
The Soviet model is a slightly heavier vehicle but is equally fuel efficient and, with a larger fuel tank, has a longer cruising range. The US analog can carry more freight even though its gross vehicle weight is the same as the Soviet model. Both models are equally powerful. The Soviet model is designed for freight transport at moderate speeds because of poor roads and is geared for a lower maximum speed.

Representativeness
This item is more representative of US production. Output of this particular Soviet model in 1967 was six times that of the US model in 1972. However, the United States produced 10 times more trucks of this type and weight class.

Automobiles
(Trucks)

Item Number 191	*Tsennik:*	110 (72); 70
Dump truck, off-highway, 4 x 2	**Rubles:**	26,050
	Dollars:	68,898
	Ruble-Dollar Ratio:	.38

Soviet Model: BelAZ-540A

Specifications:	USSR	US	Difference (US as percent of USSR)
Cargo capacity (tons)	27	25.4	94
Volume of cargo body (m^3)	15.3	13.9	91
Gross vehicle weight (kg)	47,925	47,530	99
Engine type	Diesel	Diesel	—
Number of cylinders	12	8	67
Engine power			
hp	360	321	89
at rpm	2,100	2,100	100
Maximum torque			
kgm	130	122	94
at rpm	1,500	1,525	102
Maximum speed, full load (km/hr)	55	54	98
Time to raise platform (sec)[1]	25	14	56
Time to lower platform (sec)[1]	20	9.5	48

[1] The lower the numerical value of the specification, the greater the capability.

Function
Off-highway dump trucks are used in open pit mining and quarry operations and for large construction projects.

Comparability
Both vehicles are very similar in cargo capacity, weight, horsepower, and top speed characteristics. Although the engine in the US analog has a smaller displacement, it is a two-stroke type and nearly matches the power of the Soviet vehicle through turbocharging. The US truck is twice as fast in raising and lowering its dump platform because it has a higher capacity hydraulic system. The Soviet truck is a little better in tons of payload per ton of empty weight.

Representativeness
This item is more representative of Soviet production. In fact, the Soviet model represents the total Soviet production of about 1,000 off-highway dump trucks in 1967. The United States produced about 2,000 off-highway dump trucks in 1972, but about 80 percent of them were more than 27-ton capacity.

Automobiles
(Passenger Cars)

Item Number 192	***Tsennik:***	110 (72); 402
Open-body jeep, 4 x 4	**Rubles:**	1,410
	Dollars:	3,662
	Ruble-Dollar Ratio:	.39
Soviet Model: GAZ-69		

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Curb weight (kg)	1,525	1,714	112
Gross vehicle weight (kg)	2,175	2,359	108
Engine type	Gasoline	Gasoline	—
Number of cylinders	4	6	150
Engine power			
hp	52	110	212
at rpm	3,600	3,800	106
Maximum torque			
kgm	12.5	25	200
at rpm	2,000	1,600	80
Maxium speed, full load (km/hr)	90	100	111
Fuel consumption (ltrs/100 km)	14	17	121
Travel distance without refueling (km)	615	465	76

Function
These are eight-passenger, all-terrain vehicles, used in military and civilian applications.

Comparability
Both vehicles are similar in size and weight but not in the size of the engine or its performance. The US analog outperforms the Soviet model with a higher top speed and greater reaction over poorer, hilly roads and terrain. But the Soviet vehicle has a lower fuel consumption and a higher cruising range because of its lower operating speed and smaller engine.

Representativeness
This item is more representative of Soviet production. The Soviet model was the primary jeep produced in the USSR in 1967, representing about 15 percent of passenger car production. Output of the US model in 1972 was twice that of the USSR but represented only about 2 percent of total car production.

Automobiles
(Passenger Cars)

Item Number 193	***Tsennik:***	110 (72); 385
Four-door sedan, 4 x 2, four-passenger	**Rubles:**	1,700
	Dollars:	2,384
	Ruble-Dollar Ratio:	.71

Soviet Model: Moskvich-412

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Curb weight (kg)	1,000	1,167	117
Gross vehicle weight (kg)	1,340	1,519	113
Engine type	Gasoline	Gasoline	—
Number of cylinders	4	6	150
Engine power			
hp	75	100	133
at rpm	3,000	3,600	120
Maximum torque			
kgm	11.4	25.5	224
at rpm	3,000	1,800	60
Maximum speed, full load (km/hr)	140	145	104
Fuel consumption (ltrs/100 km)	8.8	9.3	106
Travel distance without refueling (km)	523	811	155

Function
These are four-passenger highway vehicles for urban and rural transportation.

Comparability
The US analog, although similar to the Soviet model in size, weight, top speed, and fuel consumption, has a larger, more powerful engine, giving it more acceleration for high-speed highway driving and stronger climbing ability on hilly roads. The Soviet vehicle is designed for slower city and highway traffic for shorter driving distances.

Representativeness
This item is more representative of Soviet production, accounting for about 30 percent of total passenger car production in 1967. The US model represented less than one-half of 1 percent of passenger car production in 1972.

Automobiles
(Passenger Cars)

Item Number 194	***Tsennik:***	42 (73); 442
Four-door sedan, 4 x 2	**Rubles:**	2,730
	Dollars:	2,801
	Ruble-Dollar Ratio:	.97

Soviet Model: GAZ-24

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Curb weight (kg)	1,400	1,390	99
Gross vehicle weight (kg)	1,800	1,888	105
Engine type	Gasoline	Gasoline	—
Number of cylinders	4	6	150
Engine power			
hp	95	110	116
at rpm	4,500	3,800	84
Maximum torque			
kgm	19.2	25.5	133
at rpm	2,400	1,600	67
Maximum speed, full load (km/hr)	145	145	100
Fuel consumption (ltrs/100 km)	8	11.2	140
Travel distance without refueling (km)	680	541	80

Function
These are five-passenger highway vehicles for urban and rural transportation.

Comparability
The Soviet model is a less powerful vehicle than the US analog with a smaller engine and 20 percent less fuel consumption. Because of its greater fuel efficiency, the Soviet model has a greater cruising range even with a smaller gas tank. Although both cars are of equal size, weight, and top speed capability, the US analog can accelerate faster and is better suited for highway driving needs.

Representativeness
This item is more representative of Soviet production, accounting for about 25 percent of total passenger output in 1967. The US analog represented about 3 percent of US output in 1972. However, the United States produced 15 times as many cars in this general size and weight class.

Automobiles
(Buses)

Item Number 195	*Tsennik:*	110 (72); 356
City bus, 4 x 2	**Rubles:**	15,050
	Dollars:	39,869
	Ruble-Dollar Ratio:	.38

Soviet Model: LiAZ-677

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Passengers			
Seated	25	45	180
Total, including standees	80-110	90	112-82
Curb weight (kg)	7,800	8,663	111
Gross vehicle weight (kg)	15,570	15,876	102
Engine type	Gasoline	Diesel	—
Number of cylinders	8	8	100
Engine power			
hp	185	172	93
at rpm	3,200	2,000	62
Maximum torque			
kgm	47.5	70	147
at rpm	1,800	1,000	56
Maximum speed, full load (km/hr)	70	80	114
Fuel consumption (ltrs/100 km)	45	47	104
Travel distance without refueling (km)	550	766	139

Function
These are city buses with a large passenger capacity.

Comparability
The Soviet bus does not seat as many passengers and is lighter than its US counterpart. Nevertheless, it carries more passengers during rush hours. The US bus has a diesel engine giving it higher torque for better hill climbing and better acceleration with a full load.

Representativeness
This item is more representative of Soviet production. The USSR produced about 40,000 buses of all types in 1967, most of which were buses for public transportation and about 20 percent of which were accounted for by the LiAZ-677. In 1972, the United States produced about 7,800 buses of all types, a large share of which were school buses, and only a few hundred of which were the model of the US analog. The public transportation system is less developed in the United States because of the great preference for private automobiles.

Automobiles
(Buses)

Item Number 196	*Tsennik:*	110 (72); 349
City bus, 4 x 2	**Rubles:**	5,050
	Dollars:	29,800
	Ruble-Dollar Ratio:	.17

Soviet Model: PAZ-672

Specifications:	USSR	US	Difference (US as percent of USSR)
Passengers			
Seated	23	25	109
Total, including standees	45	45	100
Curb weight (kg)	4,535	5,700	126
Gross vehicle weight (kg)	8,060	8,762	109
Engine type	Gasoline	Gasoline	—
Number of cylinders	8	8	100
Engine power			
hp	115	220	191
at rpm	3,200	4,000	125
Maximum torque			
kgm	29	51	176
at rpm	2,000	2,400	120
Maximum speed, full load (km/hr)	80	97	121
Fuel consumption (ltrs/100 km)	20.5	34	166
Travel distance without refueling (km)	512	890	174

Function
These are medium-sized city buses with moderate carrying capacity.

Comparability
The Soviet and US buses are well matched. Both have special unitized bus bodies built to give long service, and both carry about the same number of passengers. However, the Soviet bus has leaf springs, manual transmission, and vacuum-assisted hydraulic brakes whereas the US analog has air springs, automatic transmission, and air brakes. The air springs should give a smoother ride, and the automatic transmission and air brakes should make for easier handling. With its more powerful engine and, hence, greater speed, the analog should be able to operate on shorter scheduling.

Representativeness
This item is more representative of Soviet production. The USSR produced about 40,000 buses of all types in 1967, most of which were buses for public transportation and about 40 percent of which were accounted for by the PAZ-672. In 1972, the United States produced about 7,800 buses of all types, a large share of which were school buses and less than 100 of which were the model of the US analog. The public transportation system is less developed in the United States because of the great preference for private automobiles.

Automobiles
(Gasoline Engines)

Item Number 197	*Tsennik:*	25 (72); 30
Gasoline engine	**Rubles:**	440
	Dollars:	1,099
	Ruble-Dollar Ratio:	.40

Soviet Model: 6Cb $\frac{10.16}{11.43}$

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type of engine	Gasoline	Gasoline	—
Number of cylinders	6	6	100
Engine power			
brake hp	109	111	102
at rpm	2,800	2,800	100
Rated torque			
kgm	34	37.5	110
at rpm	1,100	1,200	109
Specific fuel consumption (grams/brake hp/hr)[1]	255	222	87
Displacement (ltrs)	5.56	4.88	88
Weight (kg)	440	378	86
Guaranteed engine life to overhaul (hr)	500	1,000[2]	200

[1] The lower the numerical value of the specification, the greater the capability.
[2] Warrantee period. Actual time to first overhaul should be greater.

Function
These are general-purpose engines that are most often installed in medium-size (5-ton) trucks.

Comparability
The Soviet engine is a copy of the US engine, in its World War II design, that does not incorporate subsequent improvements that are in the US model; hence, the superior performance of the US engine. The major modification to the US model was a shift from a side valve configuration to overhead valves.

Representativeness
This item is more representative of Soviet production. In 1972, the US engine was not used in many trucks or buses. The Soviet engine was used in about 10 percent of the trucks in 1967.

Tractors

Item Number 198	*Tsennik:*	25 (72); 566
Tractor, tracklaying, skidding	**Rubles:**	5,620
	Dollars:	16,976
	Ruble-Dollar Ratio:	.33

Soviet Model: TDT-55

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel	Diesel	—
Rated engine horsepower	62	NA	—
Maximum drawbar horsepower [1]	47	48.6	103
Maximum drawbar pull (kg)	6,200	8,200	132
Number of speeds, fwd/rev	5/1	8/4	160/400
Forward speed range (km/hr)	2.5-11.0	2.1-10.8	84-98
Reverse speed range (km/hr)	2.3	2.7-10.3	117-448
Maximum winch pull (kg)	7,250	7,480	103
Dry weight with cab (kg)	8,700	6,600	76

[1] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.

Function
Log skidders are used in forestry to pull fallen trees from cutting areas to staging areas for processing or loading onto transport.

Comparability
The US tractor is a general-purpose model that performs the same function as the Soviet model but is used also in a wide variety of other applications such as bulldozing; hence, the high number of speeds. The Soviet tractor is a special-purpose model used only in logging. The 32 percent greater pulling power of the US analog is offset to some degree by design features on the Soviet model that permit it to operate more efficiently in adverse terrain and weather, conditions that often prevail in logging areas. For example, the Soviet model has an older, but more sophisticated and softer riding, track system than the US model which should permit it to operate at relatively higher speeds over rough terrain. Moreover, on the Soviet model the ends of logs are winched up onto a rear deck plate, thus reducing the drag during travel, and probably track slippage as well under muddy conditions. The US model simply winches ends of the logs off the ground high enough to keep them from digging in during travel.

Representativeness
This item is more representative of Soviet production. Virtually all log skidders in the USSR were tracked in 1967, whereas a great many wheeled skidders have been in use in the United States for a number of years. Production of the TDT-55 began in 1967, but it is based on a model that has been in production since the early 1960s.

Tractors

Item Number 199	*Tsennik:*	25 (72); 546
Tractor, tracklaying, general-purpose	**Rubles:**	3,590
	Dollars:	16,987
	Ruble-Dollar Ratio:	.21

Soviet Model: DT-75

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel	Diesel	—
Rated engine horsepower	75	NA	—
Rated drawbar horsepower [1]	56 [2]	68	121
Rated drawbar pull (kg)	3,400	4,590	135
Maximum drawbar pull (kg) [3]	3,850	5,560	144
Number of speeds, fwd/rev	7/1	5/5	71/500
Forward speed range (km/hr)	5.1-10.7	4.0-7.4	78-69
Reverse speed range (km/hr)	4.4	4.8-8.9	109-202
Weight (kg) [4]	6,370	6,800	107

[1] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.
[2] The maximum during testing was 61.1 drawbar horsepower.
[3] With ballast and 3 percent slippage on the Soviet model; at point of first slippage and no ballast on the US model.
[4] In serviced condition without ballast or driver; shipping weight for the US model.

Function

Tractors of this size are typically used for plowing and other field work on large farms. With modifications, they also are used in construction work and other industrial applications.

Comparability

The United States does not produce a general-purpose tracklaying tractor of as low power as the Soviet model. Therefore, the US analog should consistently outperform the Soviet model on jobs where power is essential. The Soviet tractor has a slight advantage in its higher forward speed in basic operations such as plowing where the work goes on hour after hour over large areas. In normal field operations, there is not much of an advantage to the higher reverse speed of the US analog.

Representativeness

This item is more representative of Soviet production. Nearly one-half of the tractors produced in the USSR in 1967 were tracklaying models compared with about 10 percent in the United States in 1972. Of the Soviet tracklaying tractors produced in 1967, about 27 percent were 75-horsepower DT-75s or T-74s (a tracklaying model quite similar in appearance and performance to the DT-75). The US model falls in a horsepower class that accounted for about one-fifth of 1972 production. Production of the DT-75 began in 1963.

Tractors

Item Number 200	*Tsennik:*	25 (72); 551
Tractor, tracklaying, general-purpose	**Rubles:**	4,760
	Dollars:	21,674
	Ruble-Dollar Ratio:	.22

Soviet Model: T-100M

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel	Diesel	—
Rated engine horsepower	108	105 [1]	97
Rated drawbar horsepower [2]	76	90	118
Maximum drawbar horsepower	87	NA	—
Maximum drawbar pull (kg)[3]	10,700	11,130	104
Number of speeds, fwd/rev	5/4	5/4	100/100
Forward speed range (km/hr)	2.4-10.1	2.7-11.1	112-110
Reverse speed range (km/hr)	2.8-7.6	3.4-10.1	121-133
Weight (kg) [4]	11,450	10,900	95

[1] Flywheel horsepower, the close equivalent of Soviet engine horsepower.
[2] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.
[3] With standard transmission.
[4] In serviced condition ready to operate.

Function

General-purpose tracklaying tractors of this size, with use of optional track widths, hydraulic mounting equipment, and rear hitches, function in a wide variety of industrial applications and, on a much smaller scale, in agriculture.

Comparability

The US and Soviet tractors are closely comparable in maximum drawbar pulling capacity, but the slight edge of the US analog in power and pull coupled with its higher speed would probably result in a somewhat higher level of performance in most operations. The faster reverse speed of the US model would give it a particular advantage when used as a bulldozer in "back and fill" work.

Representativeness

This item is more representative of Soviet production. Nearly one-half of the tractors produced in the USSR in 1967 were tracklaying models compared with about 10 percent in the United States in 1972. Within the category of tracklaying tractors, however, the US analog is fairly representative, falling within a horsepower class that accounted for about one-fifth of 1972 production. The T-100M by itself accounted for about 15 percent of Soviet tracklaying tractor production in 1967. Production of the T-100M began in 1963.

Tractors

Item Number 201	*Tsennik:*	25 (72); 562
Tractor, tracklaying, industrial	**Rubles:**	17,570
	Dollars:	40,979
	Ruble-Dollar Ratio:	.43

Soviet Model: T-180

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Type of engine	Diesel	Diesel	—
Rated engine horsepower	180	180 [2]	100
Rated drawbar pull (kg)	13,820	13,910	101
Number of speeds, fwd/rev	5/2	5/4	100/200
Forward speed range (km/hr)	2.9-12.0	2.9-7.2	100/60
Reverse speed range (km/hr)	3.2-7.5	3.4-6.6	106-88
Weight (kg) [3]	15,850	15,420	97

[1] With a five-speed optional direct drive transmission which provides almost exactly the drawbar pull to match the Soviet model. With a five-speed standard transmission the tractor is not a good match because of its greater pulling power and wider speed ranges in forward and reverse.
[2] Flywheel horsepower, the close equivalent of Soviet engine horsepower.
[3] In serviced condition.

Function

Tractors of this size are used in a variety of industrial applications as bulldozers, pushers, and rippers.

Comparability

The US and Soviet tractors are used for much the same types of work and would perform similarly in first gear. The faster forward speed of the Soviet tractor is offset by relatively poor pulling power in fifth gear. In fifth gear, drawbar pull drops to under 60 percent of the fifth gear pull of the US analog. This deficiency would be a distinct disadvantage in jobs in which both power and speed are essential (a very common situation with tractors of this size). The Soviet tractor probably is geared in this way to make it useful in a broader range of operations than the US model since the USSR produces a more limited range of horsepower sizes than the United States in large industrial tractors.

Representativeness

This item is more representative of Soviet production in the sense that tracklaying tractors accounted for about 50 percent of Soviet production in 1967 compared with about 10 percent of US production in 1972. However, within the category of heavy-duty industrial tracklaying tractors, the US model is more representative. The United States produced over 5,000 industrial tracklaying tractors of this horsepower and larger in 1972 compared with only about 1,000 in the USSR in 1967. Production of the T-180 began in 1965.

Tractors

Item Number 202	*Tsennik:*	25 (72); 490
Tractor, wheeled, agricultural	**Rubles:**	1,700
	Dollars:	3,035
	Ruble-Dollar Ratio:	.56

Soviet Model: T-25

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel, air-cooled	Gas, water-cooled	—
Rated engine horsepower	20	25 [1]	125
Maximum drawbar horsepower [2]	15.9	21.25	134
Maximum drawbar pull (kg)[3]	766	1,060	138
Number of speeds, fwd/rev	6/6	4/1	67/17
Forward speed range (km/hr)[4]	5.7-21.6	3.2-21.7	56-100
Reverse speed range (km/hr)	5.7-21.6	4.8	84-22
Weight (kg)[5]	1,725	2,189	127

[1] PTO (power takeoff) horsepower.
[2] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.
[3] Test results at 4.9 km/hr with 100 kilograms of ballast on the Soviet tractor and about 980 kilograms of ballast on the US model. The T-25 presumably was properly ballasted to achieve the best results.
[4] The T-25 also has a speed reducing gear system of three speeds that, when engaged, will permit a speed as low as 0.97 km/hr.
[5] In serviced condition with driver and ballast.

Function

Tractors of this size typically are used for general farm work on small farms and for special requirements on large farms.

Comparability

The US analog undoubtedly would outperform the Soviet model in any application in which its higher power could be utilized. However, the Soviet model has some advantages over the US model: (1) a wider range of speeds which permits gear selections more closely keyed to work requirements; (2) a diesel engine that should result in somewhat lower fuel operating costs vis-a-vis the gasoline engine on the US model; and (3) a conventional three-point hitch which would permit a greater versatility in the types of implements that can be used compared with the special one-point hitch on the US analog.

Representativeness

This item is more representative of US production. Wheeled tractors accounted for about 90 percent of US tractor production in 1972 compared with about 50 percent in the USSR. In both countries, however, the respective models are at the low end of the power range. The Soviet model horsepower size accounted for between 6 and 7 percent of production in 1967, and the US model falls in the 9 to 34 horsepower range that accounted for about 8 to 9 percent of production in 1972. The T-25 is patterned closely on a model that has been in production since the late 1950s.

Tractors

Item Number 203	*Tsennik:*	25 (72); 499
Tractor, wheeled, agricultural	**Rubles:**	2,750
	Dollars:	5,426
	Ruble-Dollar Ratio:	.51

Soviet Model: T-40A

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel, air-cooled	Diesel, water-cooled	—
Rated engine horsepower	40	37.9 [1]	95
Maximum drawbar horsepower [2]	34.2	33.1	97
Maximum drawbar pull (kg)[3]	2,115	2,171	103
Number of speeds, fwd/rev	6/6	8/2	133/33
Forward speed range (km/hr)	6.1-26.7	2.2-24.4	36-91
Reverse speed range (km/hr)	6.1-26.7	NA	—
Weight (kg)[4]	2,864	2,100	73

[1] PTO (power take-off) horsepower.
[2] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.
[3] Test data at a ballasted weight of 4,180 kilograms for the Soviet model and 2,996 kilograms for the US model. At these drawbar pulls, the speed of the two tractors was about the same, but the wheel slippage was higher on the US model because it does not have four-wheel drive.
[4] In serviced condition without ballast.

Function

Tractors of this size typically are used for general farm work on small and medium farms, for special requirements on large farms, and for farm transport.

Comparability

The US and Soviet tractors would have similar capabilities in normal farming operations. The Soviet model, however, would have an advantage in extremely adverse conditions since it has four-wheel drive that automatically engages at a certain level of wheel slippage. The United States does not provide four-wheel drive on tractors this small. On the other hand, the US analog has an operating advantage in speeds in the working gears: six evenly spaced gears from 2.2 to 13.3 km/hr whereas the Soviet model starts at 6.1 and goes up to 10.0 km/hr in its four working gears, leaving a gap at the lower speeds that its special low-low speed of 1.6 km/hr does not fill.

Representativeness

This item is more representative of US production. Wheeled tractors accounted for about 90 percent of US production in 1972 compared with about 50 percent in the USSR in 1967. Within the category of wheeled tractors, however, these models are of a very common power size in both countries. Production of the T-40A began in 1965.

Tractors

Item Number 204	*Tsennik:*	25 (72); 502
Tractor, wheeled, agricultural	**Rubles:**	2,690
	Dollars:	5,692
	Ruble-Dollar Ratio:	.47

Soviet Model: MTZ-50

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel	Diesel	—
Rated engine horsepower	55	52.6 [1]	96
Maximum drawbar horsepower [2]	48.2	47.6	99
Maximum drawbar pull (kg)[3]	2,500	2,500	100
Number of speeds, fwd/rev	9/2	8/2	89/100
Forward speed range (km/hr)	1.65-25.8	2.4-27.0	145-105
Reverse speed range (km/hr)	3.5-5.95	3.7-13.0	106-218
Weight (kg)[4]	2,750	2,385	87

[1] PTO (power take-off) horsepower.
[2] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.
[3] Test results at 5.2 km/hr at a ballasted weight of 5,885 kilograms for the Soviet model and 3,742 kilograms for the US model.
[4] In unserviced condition without ballast. The Soviet model has an enclosed metal cab; the US analog is equipped with an optional cloth cab.

Function

Tractors of this size typically are used for general farm work on small farms and medium farms, for special requirements on large farms, and for farm transport.

Comparability

The US and Soviet tractors would have similar capabilities in normal farming operations, but, where extra traction was needed, the Soviet model would require more ballasting than the US analog to do the job. In addition, the US tractor, with its faster reverse, would have some advantage in special situations.

Representativeness

This item is more representative of US production. Wheeled tractors accounted for about 90 percent of US production in 1972 compared with about 50 percent in the USSR in 1967. Within the category of wheeled tractors, however, these models are of a common size in both countries. Production of the MTZ-50 began in 1963.

Tractors

Item Number 205	*Tsennik:**	
Tractor, wheeled, agricultural	**Rubles:**	8,250
	Dollars:	18,295
	Ruble-Dollar Ratio:	.45

Soviet Model: T-150K

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel, turbo-charged	Diesel, turbo-charged	—
Rated engine horsepower	165	146.2 [1]	89
Maximum drawbar horsepower [2]	122.4	127.7	104
Rated drawbar pull (kg)[3]	3,500	4,200	120
Number of speeds, fwd/rev	16/4	16/4	100/100
Forward speed range (km/hr)	1.8-30.1	3.2-34.6	178-115
Reverse speed range (km/hr)	6.6-10.4	6.6-12.1	100-116
Weight (kg)[4]	7,900	8,310	105

[1] PTO (power take-off) horsepower.
[2] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.
[3] At 8.5 km/hr for both tractors, with the Soviet model weighing 7,900 kilograms (no ballast) and the US model weighing 8,877 kilograms (with 488 kilograms of ballast and dual tires front and rear). Maximum drawbar pull is double the rated power shown for the US model; no data on maximum drawbar pull are available for the Soviet model.
[4] In serviced condition without ballast but with dual tires front and rear on the US model.

Function
Tractors of this size typically are used for general farm work on large farms and are especially practical for handling large tillage and planting implements.

Comparability
The US and Soviet tractors would have similar capabilities in normal farming operations. The US model, if of standard configuration, would not have quite the advantage in drawbar pull that the table indicates. The model considered here was tested only with dual tires front and rear; this feature was not available on the Soviet model. Dual tires provide better pulling power, other things being equal.

Representativeness
This item is more representative of US production. Wheeled tractors accounted for about 90 percent of US production in 1972 compared with about 50 percent in the USSR in 1967. Also, within the category of wheeled tractors, the US model is more representative.

* No *Tsennik* price is available. The ruble price is the enterprise wholesale price; the dollar price is f.o.b. factory. The ruble price is taken from *Tekhnika v sel'skom khozyaystve,* No. 11, November 1971, page 48.

Tractors

Item Number 206	*Tsennik:*	25 (72); 516
Tractor, wheeled, agricultural	**Rubles:**	17,910
	Dollars:	21,551
	Ruble-Dollar Ratio:	.83

Soviet Model: K-700

Specifications:	USSR	US	Difference (US as percent of USSR)
Type of engine	Diesel, turbo-charged	Diesel, turbo-charged	—
Rated engine horsepower	212	175.8 [1]	83
Maximum drawbar horsepower [2]	153.5	160.5	105
Rated drawbar pull (kg)[3]	8,200	9,700	118
Maximum drawbar pull (kg)[4]	10,100	10,214	101
Number of speeds, fwd/rev	16/8	16/4	100/50
Forward speed range (km/hr)	2.9-31.7	3.4-36.0	117-114
Reverse speed range (km/hr)	5.1-28.7	6.5-12.6	127-44
Weight (kg)[5]	12,000	10,045	84

[1] PTO (power take-off) horsepower.
[2] Drawbar horsepower is power actually available for pulling; approximately, it is total tractor horsepower minus the power needed to move the tractor itself.
[3] At 4.0 km/hr without ballast. Dual tires front and rear on the US model.
[4] With a total weight of 17,855 kilograms for the Soviet model at 3.96 km/hr with 15 percent slippage; with a total weight of 10,124 kilograms for the US model at 3.54 km/hr with 15 percent slippage and dual tires front and rear.
[5] In serviced condition without ballast and dual tires front and rear on the US model.

Function

Tractors of this size typically are used for general farm work on large farms and are especially practical for handling large tillage and planting implements.

Comparability

Without ballast on either model, the US analog, despite its lighter weight, would outperform the Soviet model. However, with ballasting, the capabilities of the Soviet tractor could be brought up to rough equality with the US model. Also, the advantage of the US model in drawbar pull is somewhat less than the specifications indicate because, unlike the Soviet, it was tested with dual tires front and rear. Dual tires provide better pulling power, other things being equal. Finally, the power shift on the move and the automatic differential lock on both axles of the Soviet tractor would somewhat offset the greater drawbar pull of the US analog in certain applications.

Representativeness

This item is more representative of US production. Wheeled tractors accounted for about 90 percent of US production in 1972 compared with about 50 percent in the USSR in 1967. Also, within the category of wheeled tractors, the US model is more representative, falling in a horsepower class that accounted for about 15 percent of US production in 1972 but only about 2 percent of Soviet production in 1967. Production of the K-700 began in 1964.

Agricultural Machinery

Item Number 207	*Tsennik:*	29 (73); 285
Grain combine, self-propelled	**Rubles:**	4,250
	Dollars:	12,307
	Ruble-Dollar Ratio:	.35

Soviet Model: SK-4

Specifications:	USSR	US	Difference (US as percent of USSR)
Output of grain discharge conveyor (kg/sec)	16	25	156
Working width (m) [1]	4	3.96	99
Range of travel speeds (km/hr) [2]	1.9-6.9	1-12	53-174
Grain bunker capacity (m^3)	1.8	2.07	115
Straw bunker capacity (m^3)	9	— [3]	—
Hydraulic control of reel speed and position	Yes	Yes	—
Turning speed of threshing drum (rpm)	410-1,335	387-1,172	94-88
Engine horsepower	75	64	85
Weight (kg)	6,205	5,031 [4]	81

[1] The Soviet combine also is offered with cutting widths of 3.2, 5, and 6 meters; the US model with cutting widths of 3.05, 4.27, and 4.57 meters.
[2] The normal speed of the US model in the field is 3.2 to 6.4 km/hr (2 to 4 mph). Comparable data for the Soviet model are not available but probably would be similar to the US.
[3] A straw bunker as an integral part of the combine is not offered on US models. The straw is spread on the ground behind the combine in the United States.
[4] With a 4.57-meter cutting width.

Function

Self-propelled grain combines harvest grain crops either by cutting the grain as they move through the field or picking up previously cut grain from a windrow. The grain is threshed as the combine moves along and is stored in a bunker for subsequent discharge into a truck or trailer moving alongside. The straw is retained in a bunker at the rear and dumped at intervals on the Soviet model and discharged onto the ground at the rear on the US model.

Comparability

The US analog probably is more productive than the Soviet model because of its larger grain bunker (which requires less frequent unloading), faster grain discharge rate, and the fact that it doesn't have to stop periodically to empty a straw bunker. The higher speed of the US model would also give it an advantage in getting to and from the field. In actual combining operations, the two models probably would travel at about the same speed. The attached bunker for catching and dumping the straw accounts, in part, for the heavier weight of the Soviet model and its need for a larger engine.

Representativeness

This item is more representative of Soviet production, the SK-4 having accounted for about 95 percent of grain combine production in 1967. There was a greater variety of grain combine sizes produced in the United States in 1972. Production of the SK-4 began in 1962.

Agricultural Machinery

Item Number 208	*Tsennik:*	29 (73); 302
Silage combine, tractor-drawn	**Rubles:**	1,570
	Dollars:	4,846
	Ruble-Dollar Ratio:	.32

Soviet Model: KS-2.6

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated productivity (kg/sec)	20	NA	—
Working width (m)	2.6	2.21	85
Number of rows worked [1]	3	3	100
Length of cut mass (mm) [2]	20	19.2	96
Weight (kg)	3,050	2,014	66

[1] When working in a corn field.
[2] The Soviet model chops up material at a single length of 20 millimeters. The US model is adjustable to cut 25 different lengths from 3.2 to 82.6 millimeters in increments of 3.2 millimeters.

Function

Silage combines (called forage harvesters in the US) are used to cut and chop up crops such as corn in an immature state into green silage and deposit it by means of a belt conveyor or a blower into an accompanying truck and/or trailer.

Comparability

The US analog probably is more productive and less wasteful of silage because of its system of blowing the silage directly into the accompanying truck or trailer rather than running it in on a belt conveyor. The analog also is more versatile in that it can cut the silage into varying lengths, can be equipped for picking up crops from a windrow, and can be equipped for separating not-quite-mature ears of corn from the stalks and chopping the ears up separately for a special high-protein feed. The Soviet unit can only be used in a field in which the ears have not formed or are so immature that they can be cut up along with the stalks. In the early 1970s, the USSR began producing a model much like the US model described here.

Representativeness

This item is representative of production in both countries. Production in the United States in 1972 and the USSR in 1967 was about the same—about 18,000 to 19,000 units. Production of the KS-2.6 began in 1964.

Agricultural Machinery

Item Number 209	*Tsennik:*	29 (73); 335
Cotton picker	**Rubles:**	5,750
	Dollars:	20,562
	Ruble-Dollar Ratio:	.28

Soviet Model: 14KhV-2.4

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	1.22	1.02	84
Maximum working width (m)	2.4	2.03	85
Maximum working speed (km/hr)	5.1	5.02	98
Basket capacity (m^3)	11.5	13.2	115
Number of rows worked [2]	4	2	50
Type of picking spindle	Vertical	Horizontal	—
Engine horsepower	50	70	140
Weight (kg)	6,700	5,170	77

[1] Maximum working width times maximum working speed.
[2] The Soviet picker is designed to pick rows 60 centimeters apart. The US picker is designed to pick rows from 97 to 102 centimeters apart.

Function
Cotton pickers of this type are designed to pick open-bolled cotton that has been at least partially defoliated. Further cleaning of the cotton is required after delivery to the processing areas.

Comparability
The Soviet model theoretically is more productive in terms of the area picked per hour. Actual productivity will vary with the condition of the cotton and soil and the skill of the operator. Cotton pickers in the United States operate more efficiently in the field than do Soviet pickers, making the two models closer in actual performance than the theoretical productivity in terms of area covered would indicate, but the Soviet model would have picked more cotton than the US model after covering the same area because the Soviets, using a narrower row width, plant more cotton per hectare than the United States.

Representativeness
This item is more representative of Soviet production. The USSR produced 6,600 cotton pickers in 1967. Data are not published for the United States, but production is known to be much smaller than that for the USSR. Production of the 14KhV-2.4 began in 1967.

Agricultural Machinery

Item Number 210	***Tsennik:***	29 (73); 94
Plow, moldboard, tractor-mounted	**Rubles:**	78
	Dollars:	195
	Ruble-Dollar Ratio:	.40

Soviet Model: PN-30R

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Number of bottoms	1	1	100
Theoretical productivity (ha/hr)[1]	.21	.22	105
Working width (cm)	30	30.5	102
Maximum working speed (km/hr)	7	7.2	103
Weight (kg)	160	118	74

[1] Working width times maximum working speed.

Function
These plows are used for small-scale basic plowing.

Comparability
The US and Soviet plows are comparable in productivity. Actual productivity will vary with the size of the tractor used, soil conditions, and the skill of the operator.

Representativeness
This item probably is more representative of US production. Actual production of one-bottom plows is not known for either country. The USSR produced about 100,000 tractor-mounted moldboard plows of all sizes in 1967 compared with about 45,000 drawn and mounted plows in the United States in 1972, but one-bottom plows undoubtedly accounted for a larger share of US than of Soviet production. The large size of the average Soviet farm precludes the need for large quantities of small plows. Production of the PN-30R began in 1957.

Agricultural Machinery

Item number 211	*Tsennik:*	29 (73); 113
Plow, moldboard, tractor-drawn	**Rubles:**	354
	Dollars:	1,599
	Ruble-Dollar Ratio:	.22

Soviet Model: Truzhenik-U-2

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Number of bottoms	5	5	100
Theoretical productivity (ha/hr)[1]	1.22	1.42	116
Working width (m)	1.75	1.78	102
Maximum working speed (km/hr)	7	8	114
Weight (kg)	1,340	1,162	87

[1] Working width times maximum working speed.

Function
These plows are used for large-scale basic plowing.

Comparability
The US plow is a little more productive than the Soviet. Actual productivity will vary with the size of the tractor used, soil conditions, and the skill of the operator. The US analog is semimounted (a rear transport wheel but none in front) rather than drawn, which partially accounts for its lighter weight and, hence, its slightly faster speed of operation. With the advent of higher horsepower tractors in the United States, only plows with more than five bottoms are drawn.

Representativeness:
This item is more representative of Soviet production. Five-bottom plows accounted for a significant share of the 95,000 tractor-drawn plows produced in the USSR in 1967. Production of the Truzhenik-U-2 began in 1965.

Agricultural Machinery

Item number 212	*Tsennik:*	29 (73); 66
Cultivator, field, tractor-drawn	**Rubles:**	266
	Dollars:	1,149
	Ruble-Dollar Ratio:	.23

Soviet Model: KP-4A

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	2.8	3.9	139
Working width (m)	4	4.1	102
Maximum working speed (km/hr)	7	9.6	137
Weight (kg)	883	726	82

[1] Working width times maximum working speed.

Function
Field cultivators are used to prepare a plowed field for seeding.

Comparability
The US cultivator has an edge in productivity because it is lighter and can be operated at a higher speed. Actual productivity, however, will vary with the size of the tractor used, soil conditions, and the skill of the operator. The US model is supplied only with chisel points because they are believed to break up clods better than the V-sweeps used on the Soviet model. The Soviet cultivator can be supplied with chisel points, but it is not clear that the available ruble price would be the same under that option.

Representativeness
This item is more representative of Soviet production. Of the 203,500 tractor cultivators produced in the USSR in 1967, about 86,000 were tractor drawn, consisting of only a few models. The United States produced about 56,000 in 1972, including tractor mounted. Production of the KP-4A began in 1951.

Agricultural Machinery

Item number 213	*Tsennik:*	29 (73); 22
Cultivator, deep-tillage, tractor-drawn	**Rubles:**	352
	Dollars:	1,483
	Ruble-Dollar Ratio:	.24

Soviet Model: KPG-2-150

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated productivity at 7.8 km/hr (ha/hr)	2.24 [1]	Similar	100
Working width (m)	3.1	3.05	98
Maximum working speed (km/hr)	9	Similar	100
Weight (kg)	875	941	108

[1] This is 80 percent of the theoretical productivity at maximum speed.

Function

Deep-tillage cultivators (called stubble mulch plows in the United States) are used to cultivate below the surface without disturbing the protective mulch layer on the surface, retaining it to keep in the moisture and prevent wind erosion.

Comparability

The US and Soviet cultivators are comparable in productivity, although the US analog is drawn rather than mounted. The US does not make mounted cultivators of this type, and in the post-1972 period no longer makes deep-tillage cultivators this small. The extra weight of the analog is accounted for largely by its three rubber-tired wheels (two small steel wheels on the Soviet model) and V-shaped steel tongue for pulling. Actual productivity will vary with the size of the tractor used, soil conditions, and the skill of the operator.

Representativeness

This item is more representative of Soviet production. The USSR produced 203,500 tractor cultivators of all types in 1967 compared with about 56,000 in the United States in 1972. The Soviet output of deep-tillage cultivators is not known but probably was considerably more than the 2,500 produced in the United States in 1972. Production of the KPG-2-150 began in 1965.

Agricultural Machinery

Item number 214	*Tsennik:*	29 (73); 163
Grain drill, tractor-drawn	**Rubles:**	566
	Dollars:	964
	Ruble-Dollar Ratio:	.59

Soviet Model: SZS-9

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	1.84	2.00	109
Working width (m)	2.05	2.08	101
Number of rows worked	9	8	89
Maximum working speed (km/hr)	9	9.6	107
Capacity of seed bins (dm^3)	350	246	70
Weight (kg)	1,065	463	43

[1] Working width times maximum working speed.

Function

Tractor grain drills of this type (called hoe drills in the United States) are used to plant grain crops on unworked stubble in areas where low moisture and high winds are a problem.

Comparability

The US and Soviet drills are close in productivity, although the US model is mounted rather than drawn, a fact which accounts for much of the difference in weight. The Soviet model also is built more sturdily because, unlike the US analog, an operator rides on the rear platform at all times. The seed bin on the US drill would require more frequent filling than the Soviet, but in practice this feature probably has little adverse effect on productivity. Actual productivity will vary with the size of the tractor used, soil conditions, and the skill of the operator.

Representativeness

This item probably is more representative of Soviet production. Production of this type of grain drill in 1967 and 1972, respectively, is not known, but the USSR has a larger area than the US subject to low moisture and wind erosion and would require a correspondingly larger number of such drills. Production of the SZS-9 began in 1966.

Agricultural Machinery

Item Number 215 (foreign model)	***Tsennik:***	29 (73); 170
Corn planter, tractor-mounted	**Rubles:**	631
	Dollars:	2,747
	Ruble-Dollar Ratio:	.23

Soviet Model: SKNK-8

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	5.67	6.19	109
Working width (m)	4.8-6.3	5.7-8.6	119-137
Maximum working speed (km/hr)	9	7.2	80
Number of rows planted	8	8	100
Seeds planted (thousands/ha)	26.5-89.7	20-75	75-84
Weight (kg)	1,160	1,111	96

[1] Maximum working width times maximum working speed.

Function

These planters are used to plant corn while simultaneously applying fertilizer. They can be adapted to plant other crops such as soybeans or peanuts, and the fertilizer attachment can be removed.

Comparability

The US analog and Soviet corn planters are close in productivity. The higher speed of the Soviet model is offset by the wider working width of the US analog. Actual productivity will vary with the size of the tractor used, soil conditions, and the skill of the operator. Neither model is a very sophisticated planter. Most corn planters made in the US control seed delivery through air pressure or vacuum instead of plates and can travel faster with greater planting accuracy and less seed damage. The reason for the great number of seeds planted per hectare for the Soviet model is not clear. Such quantities would be required with a poorer quality of seed with lower germination rates than prevail in the United States.

Representativeness

This item is more representative of Soviet production. This item is an exception to the general rule that an item must be produced in the United States to be considered as an analog. No close analogs to the unsophisticated Soviet planter are manufactured in the United States, but the one matched to it, although produced in another country, has been widely used in the United States for many years. Production of the SKNK-8 began in 1961.

Agricultural Machinery

Item Number 216	*Tsennik:*	29 (73); 180
Cotton planter, tractor-mounted	**Rubles:**	436
	Dollars:	1,057
	Ruble-Dollar Ration:	.41

Soviet Model: STKh-4A

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	2.04	2.30	113
Working width (m)	2.4	2.4[2]	100
Maximum working speed (km/hr)	8.5	9.6	113
Number of rows	4	4	100
Weight (kg)	590	589	100

[1] Working width times maximum working speed.
[2] Adjustable from 2.2 to 4.3 meters.

Function
These planters are used to plant delinted cotton seeds. If desired, they can be adapted to apply fertilizer simultaneously with planting.

Comparability
The US and Soviet planters are close in productivity. Actual productivity will vary with the size of the tractor used, soil conditions, and the skill of the operator. Both models can plant four rows with about 60 centimeters spacing. In addition, on the US model row spacing is adjustable up to 107 centimeters, the most common mode of spacing. When the US unit is used at its maximum working width (a common practice), its maximum working speed probably is less than that shown.

Representativeness
This item is more representative of Soviet production, although the United States probably makes more cotton planters than the USSR. Actual 1967 and 1972 production is not known. However, most US-produced cotton planters are more sophisticated than the one considered here, performing the same function but doing it more accurately, at faster speeds, and with less damage to the seed. Production of the STKh-4A began in 1963.

Agricultural Machinery

Item Number 217	*Tsennik:*	29 (73); 6
Disc harrow, heavy-duty, tractor-drawn	**Rubles:**	1,570
	Dollars:	5,775
	Ruble-Dollar Ratio:	.27

Soviet Model: BDT-7

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	5.08	5.11	101
Working width (m)	7	7.05	101
Rated working speed (km/hr)	7.25	7.25	100
Weight (kg)	3,500	3,495	100

[1] Working width times the indicated rated working speed.

Function
These harrows typically are used to break up furrows left from earlier plowing. The resultant soil bed often is then ready for crop sowing.

Comparability
The US and Soviet harrows are comparable in productivity. Actual productivity will vary with the size of the tractor used, soil conditions, and the skill of the operator.

Representativeness
This item is more representative of US production. The United States produced about 87,000 disc harrows of all types in 1972 compared with about 18,500 in the USSR in 1967. Production of the BDT-7 began in 1965.

Agricultural Machinery

Item Number 218	*Tsennik:*	29 (73); 194
Mineral fertilizer spreader, tractor-mounted	**Rubles:**	274
	Dollars:	285
	Ruble-Dollar Ratio:	.96

Soviet Model: RU-4-10

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	12	11	92
Maximum spreading width (m)[2]	12	11	92
Maximum working speed (km/hr)	10	10	100
Maximum quantity of fertilizer spread (cent/ha)	11.65	11.21	96
Capacity of bin (dm^3)	325	339	104
Weight (kg)	220	98	45

[1] Maximum spreading width times maximum working speed.
[2] Data shown are for spreading granulated fertilizer.

Function
These spreaders are used to distribute (broadcast) dry fertilizer or dry seeds of various types. When distribution accuracy is not all-important, this type of spreader has the advantage of low price and high productivity compared with more sophisticated spreading equipment.

Comparability
The US and Soviet spreaders are comparable in productivity when spreading fertilizer, but the US analog appears to be adaptable to the spreading of a greater variety of materials than the Soviet model. For some heavier materials (such as dry peas) that are thrown farther during distribution, the productivity of the US analog may exceed 16 ha/hr. In any case, actual productivity will vary with the size of the tractor used, wind and soil conditions, and the skill of the operator. The reason for the extreme difference in weight of the two units is not clear but may be explained in part by poorer anticorrosive qualities of the Soviet metal which requires the use of thicker metal.

Representativeness
This item probably is representative of production in both countries. Production of the RU-4-10 began in 1964.

Agricultural Machinery

Item Number 219	*Tsennik:*	29 (73); 216
Pesticide sprayer, tractor-drawn	**Rubles:**	620
	Dollars:	3,877
	Ruble-Dollar Ratio:	.16

Soviet Model: OVT-1

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated productivity in an orchard (ha/hr)	1.2-2	1.2-1.6	100-80
Maximum working width (m)	15	15.2	101
Maximum working speed (km/hr)	8 [1]	3.2	40
Maximum amount of pesticide sprayed (ltrs/ha)	150	163	109
Capacity of tank (ltrs)	1,200	1,136	95
Output of blower (m^3/hr)	39,000	45,900	118
Weight (kg)	910	816	90

[1] This speed apparently applies to use in an open field. In an orchard, a more common area of use, the working speed would be about the same as the US analog.

Function

Sprayers of this type (commonly called mist sprayers in the United States) are normally used in orchards where the dense foliage prevents uniform coverage with other types of sprayers. A blower sprays the pesticide into a high-velocity air stream which will reach to the tops of the trees.

Comparability

The US and Soviet models are close in rated productivity. The slightly higher rated productivity of the Soviet model probably is due to its larger tank and slower pesticide dispersal rate which mean fewer stops for refilling. However, the more powerful blower and higher dispersal rate of the US analog mean, other things being equal, a more thorough spraying of the orchard. Actual productivity will vary with the size of the tractor used, wind conditions, and the skill of the operator.

Representativeness

This item is representative of production in both countries. About 34,000 tractor-drawn sprayers were produced in the United States in 1972 compared with about 28,000 (including a small number of dusters) in the USSR in 1967. Production of the OVT-1 began in 1961.

Agricultural Machinery

Item Number 220	*Tsennik:*	29 (73); 326
Mower, tractor-mounted	**Rubles:**	132
	Dollars:	723
	Ruble-Dollar Ratio:	.18

Soviet Model: KS-2.1

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	2.5	2.4	96
Working width (m)	2.1	2.1	100
Maximum working speed (km/hr)	12	11.3	94
Shaft speed (rpm)	940	950	101
Weight (kg)	250	283	113

[1] Working width times maximum working speed.

Function
Mowers of this type are used for cutting hay for subsequent harvesting or for cutting roadside grass.

Comparability
The Soviet and US models are comparable in productivity. The greater weight of the US analog apparently reflects its more rugged construction. Actual productivity will vary with the size of the tractor used, the type and moisture content of the hay or grass being cut, and the skill of the operator.

Representativeness
This item is more representative of Soviet production. The USSR produced about 71,000 tractor-mounted mowers in 1967 compared with about 18,300 in the United States in 1972. Moreover, the two models discussed here have mowing mechanisms of the Pitman-drive type, as did all Soviet tractor-mounted mowers in 1967. In the United States, however, Pitman-drive mowers, although still popular because of their price, are being supplanted by a more sophisticated and more expensive design that permits higher speeds of operation with less vibration. Production of the KS-2.1 began in 1966.

Agricultural Machinery

Item Number 221	*Tsennik:*	29 (73); 254
Rake, dump-type, tractor-drawn	**Rubles:**	153
	Dollars:	1,197
	Ruble-Dollar Ratio:	.13

Soviet Model: GTP-6

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Theoretical productivity (ha/hr)[1]	7.2	7.8	108
Working width (m)	6	6.1	102
Maximum working speed (km/hr)	12	12.8	107
Width of windrow formed (m)	1.2	1.2-1.5	100-125
Weight (kg)	400	498	124

[1] Working width times maximum working speed.

Function

Dump-type rakes are used on large farms to rake cut hay into windrows for subsequent pick up and stacking or forming into bales.

Comparability

The US and Soviet models are comparable in function, but the US model will outperform the Soviet to a greater degree than is indicated by the 8 percent advantage in theoretical productivity. The reason lies in the dumping mechanism. The US rake is dumped and reset by a hydraulic cylinder while the unit is in continuous forward motion. The Soviet model is similar to the older US-made rakes in which the forks are raised (releasing the hay) by the forward motion of the rake and reset by momentarily reversing the direction of travel. As a result, even under the best of conditions, the Soviet model might rake only about 75 percent of its theoretical productivity. The hydraulic equipment on the US analog coupled with a special design that permits the support wheels to turn 90 degrees for easy off-the-field transport account for its relatively high price.

Representativeness

This item is more representative of Soviet production. About 53,000 hay rakes, mostly dump type, were produced in the USSR in 1967 compared with about 11,600 in the United States in 1972, only very few of which were dump type. Most US rakes are of the side-delivery type. Production of the GTP-6 began in 1953, but it has gone through various modifications without a change in model number.

Agricultural Machinery

Item Number 222	***Tsennik:***	29 (73); 346
Pick-up baler, tractor-drawn	**Rubles:**	1,710
	Dollars:	2,865
	Ruble-Dollar Ratio:	.60

Soviet Model: PSB-1.6

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Productivity (tons/hr)	Up to 10	About 15	150
Working width (m)	1.6	1.56	98
Working speed (km/hr)	1.4-6.3	NA	—
Plunger strokes per minute	60	65-75	108/125
Cross-sectional size of bale (cm)	36 x 50	35.6 x 45.7	90
Length of bale (cm)	80-90	30-132	38-147
Weight (kg)	1,900	1,242	65

Function

Pick-up balers are used to pick up hay from a windrow on the move and compact it into dense rectangular bales for easier handling and storage.

Comparability

The US baler appears to be 50 percent more productive than the Soviet. It is not clear why the difference should be so great given a similar working width, only a maximum of 25-percent difference in plunger strokes per minute, and a speed for the US model that probably is about the same as the Soviet. Productivity, however, also is affected by the type, heaviness of growth, and condition of the crop being baled, and it may be that the two balers simply have not been rated under similar average crop conditions. It also may be that the design of the US analog is such that the crop is fed into the baling chamber more rapidly and efficiently than on the Soviet model. Baler production is very competitive in the United States, and great effort is expended to create more efficient units.

Representativeness

This item is more representative of US production. About 28,000 hay balers of all types were produced in the United States in 1972 compared with 12,200 units in the USSR in 1967. Production of the PSB-1.6 began in 1964.

Agricultural Machinery

Item Number 223	*Tsennik:*	29 (73); 538
Stationary milking installation	**Rubles:**	1,120
	Dollars:	4,452
	Ruble-Dollar Ratio:	.25

Soviet Model: DAS-2

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Productivity with five attendants (cows/hr)	100	Similar	100
Type of milking units	2-stroke	2-stroke	—
Number of milking units in installation	10	10	100
Number of milk containers	10	10	100
Capacity of each milk container (ltrs)	19	26.5	139
Working vacuum (kg/cm^2)	.48	.52	108
Output of vacuum system (m^3/hr)	40	51	128
Power of electric motor (kW)	3	2.24	75
Weight (kg)	1,100	NA	—

Function
Stationary milking installations are used on dairy farms for milking cows and delivering the milk to a central processing tank through a "bucket" (container) system.

Comparability
The US and Soviet models are comparable in performance. The US analog probably would require less attention on the part of the attendants because the containers, being larger, would not have to be emptied as often, but the full containers would, of course, weigh more than the Soviet.

Representativeness
This item is more representative of Soviet production. Production data are not available. Installations of this type, although in use in the United States for many years, are now limited to the smaller dairy farms where the high labor cost inherent in them is not prohibitive. The larger US dairy farms pipe the milk directly to bulk containers, eliminating the labor-consuming "bucket" operation. While this more sophisticated type of installation was not unknown in the USSR in 1967, it was far from typical.

Agricultural Machinery

Item Number 224	*Tsennik:*	29 (73); 685
Pneumatic conveyor (forage blower)	**Rubles:**	1,152
	Dollars:	1,166
	Ruble-Dollar Ratio:	.99

Soviet Model: TP-30

Specifications:	USSR	US	Difference (US as percent of USSR)
Rated productivity (tons/hr)			
Forage or grain	30	NA	—
Loose hay or straw	12	NA	—
Maximum height forage can be raised (m)	13	12	92
Diameter of rotor (mm)	1,100	1,219	111
Diameter of conveyor pipe (mm)	220	229	104
Power of electric motor (kW)[1]	28	28.8	103
Weight (kg)	760	680	89

[1] Price comparison does not include electric motor. Either unit can be operated with an electric motor or from the power takeoff of a tractor.

Function
Conveyors of this type (called forage blowers in the United States) are used for loading forage or other loose material into a silo or other storage structure.

Comparability
The Soviet and US conveyors probably are close in performance. Productivity data are not provided by US manufacturers, but the similarity in rotor and pipe diameters of the two units suggest a similar rate of output. However, rotor diameter is extremely important as an indicator of blowing capability, and the larger rotor on the US analog probably would give it an edge over the Soviet model, particularly since it also is not blowing the silage quite as high.

Representativeness
This item is more representative of US production. Production data are not available, but the United States stores far more silage in silos and other storage structures than did the USSR in 1967 when covered trenches were used a great deal and blowers, therefore, were not needed.

Agricultural Machinery

Item Number 225	*Tsennik:*	29 (73); 81
Land leveler, tractor-drawn	**Rubles:**	1,170
	Dollars:	1,695
	Ruble-Dollar Ratio:	.69

Soviet Model: PA-3

Specifications:	USSR	US	Difference (US as percent of USSR)
Theoretical productivity in one pass (ha/hr)[1]	1.37	1.39	101
Working width (m)	3.05	2.89	95
Maximum working speed (km/hr)	4.5	4.8	107
Blade capacity (m^3 of loose soil)	NA [2]	1.34	—
Distance blade can be lowered below ground level (mm)	100	76	76
Weight (kg)	1,755	1,048	60

[1] Working width times maximum working speed.
[2] The blade capacity of 0.6 m^3 given in the *Tsennik* is not consistent with other data on the leveler or with the blade capacities of other Soviet levelers. Blade capacity probably is about equal to that of the US model.

Function

Land levelers are used to level open fields to improve drainage and facilitate gravity irrigation.

Comparability

The US and Soviet levelers are roughly comparable in performance. The Soviet model would appear to have an edge in performance, despite its covering a little less area per hour, because the blade can be lowered a greater distance into the ground, thus requiring fewer passes for the same amount of leveling compared with the US analog. However, this is an imprecise measurement because neither model would operate with the blade lowered to maximum depth across its full width. Moreover, actual performance will vary with the size of the tractor used, the condition of the soil, and the skill of the operator.

Representativeness

This item probably is more representative of US production, although land levelers are fairly common in both countries. About 109,000 units of all types were produced in the United States in 1972. Production in the USSR in 1967 is unknown but is estimated to be less than that of the United States. Production of the PA-3 began in 1964.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 226	***Tsennik:***	45 (73); 219
Marine radio transmitter	**Rubles:**	6,130
	Dollars:	5,330
	Ruble-Dollar Ratio:	1.15

Soviet Model: Msta

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Frequency range			
Medium wave (KHz)			
Continuous	400-535	None	—
Fixed	8 specific frequencies	Any 8 frequencies [1]	—
Short Wave (MHz)	1.6-23	1.6-30	100-130
Drift (percent)[2 3]	0.005	0.0001	2
Maximum output power (W)	200	150	75
Emissions			
Medium wave	Telegraph	Telegraph	—
Short wave	Voice and telegraph	Voice and telegraph	—
Ambient temperature (°C)	−10 to 50	−30 to 50	300-100
Power consumption (W)	1,300	700	54
Weight (kg)	340	44	13

[1] The US analog can operate on any of eight user-selected frequencies in the range of 405 to 535 KHz.
[2] Deviation of frequency from a nominal value.
[3] The lower the numerical value of the specification, the greater the capability.

Function
These transmitters are used on board ships to transmit voice or telegraph signals in the short wave and medium wave bands.

Comparability
The US and Soviet transmitters are comparable in function, but each has operating characteristics which are superior to that of the other. The Soviet model has greater power output, which permits communications over a greater distance. However, the transmitted signal drifts by a higher percentage, potentially causing interference to other receivers. The US model has a wider tuning range in the short-wave band, permitting more choice in the selection of a frequency. In the medium-wave band, the choice of frequencies on the US analog is limited to eight.

Representativeness
This item probably is more representative of Soviet production since the USSR builds a significantly greater number of marine vessels than the United States. The Soviet model is believed to be serially produced. The US model is batch produced in small quantities.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 227	***Tsennik:***	45 (73); 195
HF communications transmitter	**Rubles:**	20,790
	Dollars:	17,537
	Ruble-Dollar Ratio:	1.19

Soviet Model: KV-5M

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Frequencies (MHz)			
Minimum/maximum	3/22.4	1.6/30	—
Range	19.4	28.4	146
Power output (kW)	5	5	100
Noise (db) [1]	−38	−40	105 [2]
Coefficient of nonlinear distortion (percent)[3]	10	10	100
Power consumption (kW)	21	12	57
Weight (kg)	1,900	907	48

[1] Random electrical disturbances that degrade signal quality.
[2] A difference of 2 db represents a difference of 58 percent in actual value. For this specification, the lower the value, the lesser the noise.
[3] A measure of the degree of distortion of the transmitted signal.

Function
These radios are used for moderately high power transmission of voice or telegraph signals in the shortwave high-frequency band.

Comparability
The Soviet model has a narrower tuning range, meaning that its choice of frequencies for transmission is more restricted. This characteristic limits the flexibility of the Soviet set under unfavorable environmental conditions or in a crowded signal environment. The US model has slightly better noise characteristics. A 58-percent difference in noise level is not technically significant.

Representativeness
This item probably is more representative of Soviet production. The USSR is a relatively larger user of the shortwave band than the United States. The Soviet model probably is serially produced. The US analog is batch produced in small quantities.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 228	***Tsennik:***	45 (73); 612
Automatic television translation station	**Rubles:**	9,390
	Dollars:	9,683
	Ruble-Dollar Ratio:	.97

Soviet Model: TRSA-56

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Bandwidth (MHz)	4	6	150
Transmitter picture power (W)	100	100	100
Input channels (channel numbers)	2-13	2-13	100
Output channels (channel numbers)	7-13	2-13	29-100
Range (number of channels)	6	11	183

Function
Television translation stations are used to pick up weak television broadcast signals and to amplify and retransmit them on a different channel frequency for reception by home television receivers. They are in common use in areas that cannot receive a good signal directly from a broadcasting station transmitter because of distance or terrain obstructions.

Comparability
Most of the crucial performance characteristics of the Soviet model are not published, and most of those that are published are not in a form suitable for comparison with the US model. Nevertheless, the US analog apparently is superior in performance to the Soviet model. The 4 MHz bandwidth of the Soviet model is too narrow to permit the transmission of a signal of standard Soviet broadcast quality. The 625 line standard employed in Soviet TV broadcasting requires a bandwidth of 6 MHz. By comparison, the bandwidth capacity of the US model exceeds standard US broadcast quality—525 lines. Also, the Soviet model can rebroadcast on about half as many channels as the US model. The limited bandwidth and number of rebroadcast channels suggests that the Soviet model may be obsolete. The US analog is of more recent design.

Representativeness
This item is more representative of Soviet production. It is a common Soviet practice to provide television coverage of a metropolitan area such as Moscow with a central transmitter and satellite translation stations in the suburban areas. In the United States, it is usual to use only one transmitter per program. Television translation stations are probably produced in relatively greater quantities in the USSR than in the United States.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 229	***Tsennik:***	45 (73); 593
Mobile radio relay station	**Rubles:**	3,290
	Dollars:	3,023
	Ruble-Dollar Ratio:	1.09

Soviet Model: RRS-1M

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Number of 2-way channels			
Telephone	2	2	100
Telegraph	2	2	100
Frequencies (MHz)			
Minimum/maximum	60/69.975	30/76	50/109
Range	9.975	46	461
Space between fixed frequencies (KHz) [1]	75	50	67
Modulation	FM	FM	—
Transmitter power (W)	25	35	140
Receiver sensitivity [1] [2] (μV)	2	0.7	35
Ambient temperature (°C)	−10 to 50	−40 to 65	400/130
Weight with power supply (kg)	850	125	15

[1] The lower the numerical value of the specification, the greater the capability.
[2] A measure of the ability of a set to receive a weak signal.

Function
These radio relay stations consist of two receiver/transmitter combinations, each capable of receiving and retransmitting simultaneously two telephone and two telegraph signals. The stations are used as intermediate stations between two terminals. A signal transmitted from one terminal is received and retransmitted either to another intermediate station or to the other terminal. Such stations are normally used to provide reliable, low-capacity communications over short routes (under 100 miles) in sparsely populated areas or as emergency communications equipment in times of natural disasters. They are designed to be moved easily.

Comparability
The US analog has superior technical specifications. The wider frequency range and closer spacing of selectable frequencies of the US model give it seven times as many selectable operating frequencies as the Soviet model. This superior US capability is not a crucial advantage, however, since these stations normally are used in remote areas where interference from other stations is not a major problem. The US model also has a greater power output and a receiver that is nearly three times more sensitive. This indicates that the US model can operate over somewhat longer distances or with superior quality of transmission over the same distance.

Representativeness
This item is more representative of Soviet production. The Soviet model is a relatively old set that has been in production for many years. Mobile radio relay sets are produced to a relatively greater extent in the USSR because the telephone network is less developed geographically. In the United States, radio relay systems tend to be very-high-capacity types.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 230	***Tsennik:***	45 (73); 546
Radio relay transceiver	**Rubles:**	65,870
	Dollars:	29,213
	Ruble-Dollar Ratio:	2.25

Soviet Model: R-600-2MV

Specifications:	**USSR**	**US**	**Difference (US as percent of USSR)**
Number of two-way trunks			
Operating	2	2	100
Standby	2	2	100
Telephone channels per trunk	1,020	1,200	118
Length of communications link (km)	5,000	6,400	128
Typical distance between stations (km)	50	50	100
Frequencies (MHz)			
Minimum/maximum	3,400/3,900	3,700/4,200	109/108
Range	500	500	100
Modulation	FM	FM	—
Ambient temperature (°C)	10 to 35	10 to 40	100/114
Power consumption (kW)	1.6	0.385	24

Function
These radio relay stations consist of four microwave receiver/transmitter combinations, each capable of receiving and retransmitting 1,020 (USSR) or 1,200 (United States) two-way telephone conversations. Only two of the receiver/transmitter combinations are in operation at any one time; the other two are standby units. These stations are used as intermediate stations between two terminals. A signal transmitted from one terminal is received and retransmitted either to another intermediate station or to the other terminal. They are used to provide high-capacity interurban communications over distances up to several thousand kilometers. They are normally permanently installed as part of a country's mainline telephone communications system.

Comparability
The US analog has superior technical design, a function of better electronic components, which allows it to provide 18 percent more telephone channels and to maintain the quality of transmission to telephone company standards over a 28 percent longer distance.

Representativeness
This item is more representative of US production. Most of the Soviet output of radio relay equipment is low capacity—only tens or hundreds of channels. The United States generally produces mostly high-capacity systems because the US telephone network is more highly developed than the Soviet network.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 231	***Tsennik:***	45 (73); 226
Radio transceiver	**Rubles:**	440
	Dollars:	162
	Ruble-Dollar Ratio:	2.72

Soviet Model: ChIZh

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Frequencies (MHz)			
Minimum/maximum	33/46	47/57	142/124
Range	13	10	77
Number of channels	1	1	100
Modulation	FM	FM	—
Output power (W)	0.3	0.5	167
Receiver sensitivity (μV)[1, 2]	2	0.8	40
Power consumption (amps)			
Receiver	0.8	0.12	15
Transmitter	2	1.56	78

[1] A measure of the ability of a set to detect weak signals.
[2] The lower the numerical value of the specification, the greater the capability.

Function
These transceivers (combination of transmitter and receiver) are simple single-channel hand-held "walkie-talkie" radios for voice communication in the VHF band. They are commonly used for short-range communications on large construction sites, farms, timber cutting sites, and so forth.

Comparability
The differences in frequency range and output power are minor and not technically significant. The sensitivity of the Soviet unit is substantially less than the US unit, indicating the use of poorer quality electronic components. Generally, with less sensitivity and less power, the Soviet model would not be able to operate over the same distance as the US analog. This would not normally be a problem since these transmitters do not usually operate over distances greater than 1.6 kilometers. Under certain terrain or weather conditions, however, the Soviet model might show poorer performance. The US analog incorporates more recent technology.

Representativeness
This term is representative of production in both countries.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 232	***Tsennik:***	45 (73); 235
Radio transceiver	**Rubles:**	620
	Dollars:	541
	Ruble-Dollar Ratio:	1.15

Soviet Model: 42R1

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Frequencies (MHz)			
Minimum/maximum	33/46	30/50	91/109
Range	13	20	154
Number of channels	1	1	100
Modulation	FM	FM	—
Transmitter power (W)	5	25	500
Receiver sensitivity (μV)[1 2]	1.5	0.8	53
Power consumption (W)			
Receiver	90	30	33
Transmitter	120	75	62
Weight (kg)	45	8.6	19

[1] A measure of the ability of a set to detect weak signals.
[2] The lower the numerical value of the specification, the greater the sensitivity.

Function
These units are radio transceivers (combination of transmitter and receiver) intended for use as a central or base station in a network of several transceivers. They provide single voice channel communications in the very-high-frequency (VHF) band.

Comparability
The US analog has a wider frequency range, five times as much output power, and a receiver that is nearly twice as sensitive as the Soviet model. The greater power and sensitivity means that the US model can communicate at a greater distance and has superior resistance to interference from other radio signals. The difference in frequency range, which is three MHz for the US set at the lower end and 4 MHz at the upper end, is not significant.

Representativeness
This item probably is more representative of Soviet production. Both countries are large users of VHF mobile radios using transceivers of these types as base stations. However, the Soviet model is probably produced and used in relatively greater quantities because of the narrow range of types produced in the USSR and the large diversity of types produced in the United States.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 233	*Tsennik:*	45 (73); 128
Telegraph set	**Rubles:**	283
	Dollars:	565
	Ruble-Dollar Ratio:	.50

Soviet Model: ST-2MF

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum speed of operation (words/min) [1]	66.7	100	150
Distortion (percent) [2]	5	5	100
Distance of operation over wirelines (km)	300	1,000	333
Power consumption (W)	80	95	119
Weight (kg)	30	18.8	63

[1] A word has six characters (letters or numbers).
[2] Measures the degree to which a received signal differs from a transmitted signal.

Function
These units are standard manually operated teletype machines which transmit and receive coded electrical pulses representing alphanumeric text. In the transmit code, the machines are operated by typing text on a keyboard; in the receive mode, the machines automatically type the text in hard copy. The machines also have a tape punch attachment which stores the text on punched paper tape.

Comparability
The US machine is superior in performance. It can operate at a 50 percent higher rate, allowing a more rapid transmission of information.

Representativeness
This item probably is representative of production in both countries. The use of such equipment in the United States is declining for public communications, but increasing for business communications related to the use of computers. The Soviet model considered here probably is produced in relatively greater volume because few models are produced. In the United States, a wide range of types is available in a variety of modular configurations.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 234	***Tsennik:***	45 (73); 139
Facsimile transceiving equipment	**Rubles:**	929
	Dollars:	889
	Ruble-Dollar Ratio:	1.04

Soviet Model: Aragvi

Specifications:	**USSR**	**US**	**Difference (US as percent of USSR)**
Line width (mm/line) [1]	0.2	0.26	130
Receive/transmit time (min)	6	6	100
Resolution (lines/mm)	4	3.5	88
Page size (in)	NA	229 x 356	—
Power consumption (W)			
Receiver	200	60	30
Transmitter	200	60	30
Weight (kg)	33	21.3	65

[1] The lower the numerical value of the specification, the greater the capability.

Function
These facsimile machines are used to convert graphic information into electrical signals for transmission over a communications circuit, to receive such signals, and to reconvert received signals into the original graphic information. Examples of such equipment are newspaper wirephoto equipment and Long Distance Xerography (LDX).

Comparability
The performance of a facsimile machine is measured by the size of the image (page size), the quality of the reproduction (resolution and line width), and the time to process it (receive/transmit time). Receive/transmit time is identical for the Soviet and US models. The Soviet model should achieve a better quality picture since it has a narrower line width and better resolution. However, the page size for the Soviet model is not known, which makes it impossible to rate the overall quality of the match. The Soviet model seems superior, but could be inferior if the page size were significantly less than that of the US model.

Representativeness
This item probably is more representative of US production. Facsimile equipment not only is more widely produced in the United States than in the USSR, but probably also represents a greater share of US output of communications equipment than in the USSR. Both models are series produced.

Other Machine Building
(Radiotechnical Machinery and Equipment)

Item Number 235	*Tsennik:* *	
Crossbar automatic telephone exchange	**Rubles:**	96/line
	Dollars:	162/line
	Ruble-Dollar Ratio:	.59

Soviet Model: ATSK-100/2000

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Number of lines	100-2,000	90-4,000	90-200
Nominal dial pulsing (pulses/second)	10	10	100

Function
A crossbar exchange is an assembly of switches intended for use in small and medium central offices to establish connections between dial telephones.

Comparability
The difference between the maximum number of lines is not significant because both models are modular and configurations of equal size can be selected and compared. Both are designed to operate at the same nominal dial pulse rate. The Soviet model is an obsolete telephone exchange that only routes calls and lacks modern features. For example, it cannot determine the calling subscriber's number for billing purposes; the caller must dial both his own number as well as the one he is calling. Lacking this feature, the Soviet model almost certainly also lacks the features that are standard provisions of the US unit, such as sensing when unassigned or changed numbers have been dialed or coin-operated telephone dialing.

Representativeness
This item is more representative of Soviet production. The US produces crossbar exchanges of much greater sophistication and has been shifting toward electronic exchanges and computer control.

* No *Tsennik* price is available. The ruble price is the enterprise wholesale price per line; the dollar price is the f.o.b. factory price per line. The ruble price is from G. M. Myaskovskiy, *Spravochnik po tekhnicheskim sredstvam sbora; peredachi informatsii,* "Tekhnika," Kiev, 1973, page 280.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 236	***Tsennik:***	61 (72); 174
Wafer separator	**Rubles:**	4,570
	Dollars:	2,265
	Ruble-Dollar Ratio:	2.02

Soviet Model: EM-202

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum wafer diameter (mm)	55	76	138
Productivity (wafers/hr)	30	20	67
Breaking force (g)	50-5,000	0-36,290	1-580
Minimum ratio of smaller side length of dice to wafer thickness [1]	3:1	2:1	67

[1] The lower the numerical value of the specification, the greater the capability.

Function
In the manufacture of modern semiconductors, a large quantity of the same device is fabricated on a single wafer of semiconductor material. The wafer is scribed between the individual devices. Wafer separators are then used to break the slice into individual dice by applying rolling pressure to the slice as it rests on a flexible support.

Comparability
The Soviet unit has a productivity in wafers per hour substantially greater than the US unit, but cannot handle as large a wafer. True productivity measured in terms of surface area of wafers per hour is 27 percent higher for the US unit. In addition, the US unit is more versatile. A greater range of breaking force and smaller minimum ratio of dice side length to wafer thickness mean that the US unit can handle a greater range of dice sizes and wafer thicknesses.

Representativeness
This item is more representative of US production. The Soviet model almost certainly is a prototype since wafer separators did not come into use in the United States until about 1970. The US model is a standard production model that was batch produced in 1972 in small quantities.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 237	***Tsennik:***	61 (72); 173
Wafer scriber	**Rubles:**	7,110
	Dollars:	5,970
	Ruble-Dollar Ratio:	1.19

Soviet Model: EM-201

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Step range (mm)	0.01-9.99 in 0.01 increments	0.01-9.99 in 0.01 increments	100
Step accuracy (mm)	0.005	0.005	100
Length of stroke (mm)	55	63.6 and 89.0	116 and 162
Pressure on cutter (g)	0-250	5-40	0-16
Strokes per minute	10	15	150

Function
In the manufacture of modern semiconductors, a large quantity of the same device is fabricated on a single wafer of semiconductor material. Wafer scribers are used in a manner similar to a glass cutter to scratch crosshatched lines with a diamond tool at right angles on the wafer between the individual devices. The scribed wafer is subsequently broken into individual dice, each constituting a semiconductor device.

Comparability
The Soviet and US scribers are identical in terms of the spacing of the strokes of the scriber (step range) and in the accuracy of the spacing (step accuracy). However, the Soviet unit has a substantially greater range of cutter pressure. This would enable it to handle thicker wafers and perhaps even scribe some types of ceramic substrates. On the other hand, the US machine can handle larger wafers and operate at a faster rate, giving it a higher productivity than the Soviet unit.

Representativeness
This item probably is more representative of Soviet production. Scribers are series produced both in the United States and the USSR, but the trend in the United States has been away from scribing to the use of saws.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 238	***Tsennik:***	61 (72); 277
Mask aligner	**Rubles:**	10,620
	Dollars:	11,117
	Ruble-Dollar Ratio:	.96

Soviet Model: EM-512

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Wafer diameter (mm)	40	51	128
Mask dimensions (mm)	70 x 70	51 x 51 [1]	53
Alignment accuracy (mm) [2]	0.001	0.00003	3
Minimum productivity (wafers/hr)	50	80	160

[1] Standard; up to 102 x 127 available.
[2] The lower the numerical value of the specification, the better the quality.

Function
In the manufacture of modern semiconductors, selective exposure of part of a wafer of semiconductor material to light through a mask is an essential step in the production process. A mask aligner is used to position the mask relative to the wafer and to expose the appropriate parts of the slice to light.

Comparability
The US analog can handle wafers with 28 percent greater diameter. Productivity is 60 percent greater for the US unit. Therefore, true productivity of the US unit, in terms of surface area of wafers per hour, is 2.6 times that of the Soviet model. The accuracy of the US unit also is far superior to that of the Soviet model, indicating that it would have a lower percentage of defective output and be capable of producing more complex devices.

Representativeness
This item is more representative of Soviet production. Mask aligners are large-use items in semiconductor production. In the United States the trend is away from "contact" type mask aligners to more advanced "noncontact" types.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 239	***Tsennik:***	61 (72); 358
Wire bonder (manually operated)	**Rubles:**	3,830
	Dollars:	3,288
	Ruble-Dollar Ratio:	1.16

Soviet Model: Kontakt-3A

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Bonding tool pressures (g)	30-150 [1]	15-226 [2]	50-151
Range (g)	120	211	176
Wire diameters (mm)	0.02-0.1	0.018-0.114	90-114
Range (mm)	0.08	0.096	120
Dimensions of contact			
Area (mm)	0.04 x 0.04	0.05 x 0.05	156
Total contact area (mm^2)	0.0016	0.0025	156
Maximum number of bonds per hour	250	360 [3]	144
Weight (kg)	777	102	13

[1] ± 10 percent.
[2] ± 1 percent.
[3] Estimated maximum output obtainable under optimal conditions. Actual output varies with the skill of the operator.

Function
Wire bonders are used to provide electrical interconnections between a semiconductor chip and the external contacts by bonding a short length of wire to each.

Comparability
The US analog exceeds the Soviet model in every important parameter. The wider range of bond tool pressures and wire sizes on the US analog makes it possible to bond a greater variety of devices and thicknesses of materials. The greater accuracy of the US bonding pressures means greater consistency in the strength of bonds and, hence, greater reliability in the devices being bonded.

Representativeness
This item is more representative of Soviet production since it is a manually operated wire bonder. In 1972, the United States was beginning to shift toward more accurate, higher productivity, semi- and fully automatic wire bonders.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 240	***Tsennik:***	61 (72); 360
Wire bonder (manually operated)	**Rubles:**	5,290
	Dollars:	3,950
	Ruble-Dollar Ratio:	1.34

Soviet Model: UESKN-1

Specifications:	**USSR**	**US**	**Difference (US as percent of USSR)**
Maximum temperature of bonding tool (°C)	800	600	75
Bonding time (sec)	0.05-1.0	0.00001-3.1	0.02-310
Bonding tool pressures (g)	20-1,000	25-400	125-40
Range (g)	980	375	38
Wire diameters (mm)	0.03-0.1	0.018-0.127	60-127
Range (mm)	0.07	0.109	156

Function
Wire bonders are typically used to provide an electrical interconnection between a semiconductor chip and an external contact of the case by bonding one end of a short length of very thin wire to each.

Comparability
The US analog is a thermal pulse bonder that bonds using a combination of pressure and heat. The Soviet unit uses both thermal pulse and ultrasonic vibration techniques. The substantially greater heating temperature and pressure of the Soviet unit would allow it to be used with materials other than silicon, such as ceramic. The greater wire diameter range and heating pulse durations for the US unit would give it more versatility when used with silicon. The Soviet bonder is a more general-purpose device, while the US analog is more specialized and has better performance in its area of specialization.

Representativeness
This item is more representative of Soviet production, since it is a manually operated bonder. In 1972, the United States was beginning to shift toward more accurate, higher productivity, semi- and fully automatic wire bonders.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 241	***Tsennik:***	61 (72); 356
Wire bonder (manually operated)	**Rubles:**	3,420
	Dollars:	3,175
	Ruble-Dollar Ratio:	1.08

Soviet Model: Kontakt-1A

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum temperature of bonding tool (°C)	450	500	111
Bonding time (sec)	0.2-30	0-30	0-100
Bonding tool pressures (g)	10-150 [1]	25-400	250-267
Range (g)	140 [1]	375	268
Wire diameters (mm)	0.010-0.100	0.0175-0.125	175-125
Range (mm)	0.09	0.1075	119
Weight (kg)	135	44	33

[1] ± 10 percent at maximum pressure.

Function
Wire bonders are used to provide an electrical interconnection between a semiconductor chip and external contacts by bonding one end of a short length of wire to each.

Comparability
The US analog greatly exceeds the Soviet model in bonding pressure and slightly exceeds it in maximum temperature of bonding tool. Also, tool pressure may be varied much more in the US unit (larger and greater range of bonding pressures). These advantages would enable the US unit to bond a greater variety of materials and permit a greater capability for higher quality and stronger bonds. This is important for production yield and long-term reliability of bond wire connections.

Representativeness
This item is more representative of Soviet production, since it is a manually operated bonder. In 1972, the United States was beginning to shift toward more accurate, higher productivity, semi- and fully automatic wire bonders.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 242	***Tsennik:***	61 (72); 454
Transistor lifetime tester	**Rubles:**	5,710
	Dollars:	9,233
	Ruble-Dollar Ratio:	.62

Soviet Model: ZhK-2779.004

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Maximum number of transistors tested per load	100	385	385
Number of test conditions obtainable at one time	5	5	100
Maximum measurement error (percent) [1]	2.5	0.1	4
Weight (kg)	780	250	32

[1] The lower the numerical value of the specification, the greater the precision and quality.

Function
A lifetime tester is used to establish reliability standards for semiconductor devices and measure quality in production. Finished devices are placed in the tester, subjected to actual operational conditions within a specified temperature range, then electrically tested against guaranteed performance parameters.

Comparability
The US analog will test many more devices at one time than the Soviet model while providing a much higher degree of accuracy of test measurements. The relatively poor accuracy measurement capability of the Soviet model indicates a primitive design.

Representativeness
This item is more representative of Soviet production. Models more similar to the Soviet have not been made in the United States for more than 15 years. Lifetime testers are not a volume production item. Most have been custom designed in the United States.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 243	***Tsennik:***	61 (72); 203
Vacuum deposition unit	**Rubles:**	41,900
	Dollars:	26,612
	Ruble-Dollar Ratio:	1.57

Soviet Model: ION-IV

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Ultimate pressure in the workchamber (torr)[1]	$5x10^{-5}$	$8x10^{-7}$	1.6
Time to reach ultimate pressure (min)[1]	45	14	31
Volume of the workchamber (m^3)	0.22	0.059	27
Maximum size of substrate (area in mm^2)	2,880	676	23

[1] The lower the numerical value of the specification, the greater the capability.

Function
Vacuum deposition units of this type are used mainly for the fabrication of hybrid, thin-film semiconductors. A glass or ceramic-substrate material is placed in the vacuum chamber and coated with any of several metals to form capacitors, resistors, and electrical interconnection paths.

Comparability
The Soviet unit has a larger production capacity (volume of workchamber) but cannot achieve the low pressures (high vacuum) of the US unit. For the intended application, pressure in the chamber rather than volume of the chamber is the more significant specification. Generally, these units are used for high-quality custom-made devices, not volume production. The lower the pressures obtainable , the higher the quality of the device. The Soviet unit cannot achieve US vacuum levels because of inferior vacuum and booster pumps.

Representativeness
This item is more representative of Soviet production. Vacuum deposition units are used in a wide variety of appliances in addition to electronics. Hence, this equipment is produced in moderately large volume. Models in the United States tend to be more sophisticated with many advance features such as vacuum interlocks and automatic valving.

Other Machine Building
(Semiconductor Production Equipment)

Item Number 244	***Tsennik:***	61 (72); 224
Diffusion furnace, two-zone	**Rubles:**	13,200
	Dollars:	6,439
	Ruble-Dollar Ratio:	2.05

Soviet Model: SDD-13

Specifications:	**USSR**	**US**	**Difference** (US as percent of USSR)
Operating temperatures (°C)	700-1,300	350-1,300	50-100
Range (°C)	600	950	158
Number of operating tubes [1]	2	2	100
Accuracy of temperature control (°C)	±0.5	±0.5	100
Work zone, length (mm)	350	475	136
Diameter of tube (mm)	57	85	149
Weight (kg)	1,000	1,000	100

[1] One tube is used to convert solid material to gas for use in the other tube.

Function
In the fabrication of semiconductor devices, diffusion furnaces are used to dope selectively a pure silicon wafer with highly controlled doses of other materials to form the basic electronic elements—diodes, transistors, and integrated circuits. Doping materials are gasified and diffused into the silicon wafer. The process takes place at very high temperatures.

Comparability
The critical specification for the equipment is temperature control which governs the quality of the device. These units are not used for high volume production but rather for small-scale production of specialized devices. Hence, the advantage that the US analog has in the length of the work zone and diameter of the tube—which makes the US analog more productive—is not of crucial significance. The US furnace is more versatile than the Soviet model—can process more different kinds of devices—since it has a greater range of operating temperatures.

Representativeness
This item is more representative of Soviet production. In the United States, diffusion furnaces of this type are limited to use in laboratory development work.

Other Machine Building
(Civilian Aircraft)

Item Number 245	*Tsennik:* *	
Civilian passenger aircraft	Rubles:	2,200,000
	Dollars:	1,500,000
	Ruble-Dollar Ratio:	1.47

Soviet Model: AN-24

Specifications:	USSR	US	Difference (US as percent of USSR)
Passenger load	50	54	108
Number of engines	2	2	100
Thrust per engine (hp)	2,500	2,475	99
Cruise speed (km/hr)	410	442	108
Range (nm)	1,200	1,100	92
Payload (kg)	5,900	6,125	104

Function
These aircraft carry passengers and small amounts of cargo over short distances.

Comparability
The match is very close in all respects.

[1] No *Tsennik* price is available. The ruble price is based on unpublished data.

Representativeness
This item is representative of production in both countries. In each country, however, these particular models would comprise only a small percentage of total aircraft production.

Appendix G

Appendix G

List of Sources for Ruble Prices

	Title	Sample Item Number
A. 1 January 1972 *Tsennik* Series		
1.	*Tsennik Number 1 dlya pereotsenki elektricheskikh mashin (elektrodvigateley, generatorov i preobrazovateley),* "Energiya," Moscow, 1970. (Covers electrical machinery, including electric motors, generators, and transformers.)	13-23
3.	*Tsennik Number 3 dlya pereotsenki vysokovol'tnoy apparatury i izdeliy silovoy preobrazovatel'noy tekhniki,* "Energiya," Moscow, 1970. (Covers high-voltage apparatus and items of power transformer equipment.)	33-36
7.	*Tsennik Number 7 dlya pereotsenki nasosov vsekh tipov (krome vakuum-nasosov),* "Mashinostroyeniye," Moscow, 1970. (Covers pumps of all types, except vacuum pumps.)	122-124
8.	*Tsennik Number 8 dlya pereotsenki kompressornogo oborudovaniya i vakuum-nasosov,* "Mashinostroyeniye," Moscow, 1970. (Covers compressor equipment and vacuum pumps.)	125-126
11.	*Tsennik Number 11 dlya pereotsenki metallorezhushchikh stankov i avtomaticheskikh liniy po sostoyaniyu na 1 yanvarya 1972 goda,* "Mashinostroyeniye," Moscow, 1970. (Covers metalcutting machine tools and automatic lines.)	57-75
12.	*Tsennik Number 12 dlya pereotsenki kuznezhno-pressovykh mashin,* "Mashinostroyeniye," Moscow, 1970. (Covers forge-press machinery.)	82-89
13.	*Tsennik Number 13 dlya pereotsenki liteynogo oborudovaniya po sostoyaniyu na 1 yanvarya 1972 g.,* "Mashinostroyeniye," Moscow, 1970. (Covers foundry equipment.)	90-91

	Title	Sample Item Number
A. 1 January 1972 *Tsennik* Series (continued)		
16.	*Tsennik Number 16 dlya pereotsenki pod"emno-transportnogo oborudovaniya gruzopod"emnykh i transportiruyushchikh mashin.* (Covers hoist-transport equipment and goods lifting and transporting machines.) Note: This *Tsennik* is not available. The price was taken from the secondary source given in the footnote to Item 151 in appendix B.	151
23.	*Tsennik Number 23 dlya stroitel'nykh i dorozhnykh mashin.* (Covers construction and road machinery.) Note: This *Tsennik* is not available. The prices were taken from the secondary source given in the footnote to Item 150 in appendix B.	150, 152, 159
25.	*Tsennik Number 25 dlya pereotsenki dizeley statsionarnykh, dizel'-generatorov, gazomotokompressorov, dvigateley karbyuratornykh i traktorov, primenyaemykh v lespromkhozakh i drugikh promyshlennykh predpriyatiyakh,* "Kolos," Moscow, 1970. (Covers stationary diesels, diesel generators, gas motor compressors, carburetor engines, and tractors used in forestry industry enterprises and in other indus-trial enterprises.)	10-12, 28-29, 197-204, 206
26.	*Tsennik Number 26 dlya pereotsenki oborudovaniya teplovykh elektrostantsiy moshchnost'yu ot 4,000 kvt i vyshe,* "Energiya," Moscow, 1970. (Covers equipment for thermal power stations of 4,000 kilovolt and up.)	1-9
28.	*Tsennik Number 28 dlya pereotsenki oborudovaniya promyshlennykh gidroelektrostantsiy,* "Energiya," Moscow, 1970. (Covers equipment for industrial hydroelectric power stations.)	24-27
29.	*Tsennik Number 29 dlya pereotsenki oborudovaniya sel'skikh gidroeletrostantsiy i dizel'nykh elektrostantsiy,* "Energiya," Moscow, 1970. (Covers equipment for rural hydroelectric power stations and diesel electric power stations.)	30-32

	Title	Sample Item Number
A. 1 January 1972 *Tsennik* Series (continued)		
32.	*Tsennik Number 32 dlya pereotsenki spetsializirovannogo oborudovaniya neftedobyvayushchey promyshlennosti (burovoye i ekspluatatsionnoye oborudovaniye),* "Nedra," Moscow, 1970. (Covers specialized equipment for the petroleum extraction industry [drilling and exploitation equipment].)	110-111
34.	*Tsennik Number 34 dlya pereotsenki spetsializirovannogo oborudovaniya gazobenzinovykh i geliyevykh zavodov,* "Nedra," Moscow, 1970. (Covers specialized equipment for natural gas and helium plants.)	112
36.	*Tsennik Number 36 spetsializirovannyye mashiny i oborudovaniye ugol'noy i gornorudnoy promyshlenosti,* "Nedra," Moscow, 1970. (Covers specialized machinery and equipment for the coal- and ore-mining industry.)	113-117
39.	*Tsennik Number 39 dlya pereotsenki spetsializirovannogo oborudovaniya domennykh, staleplavil'nykh, prokatnykh, truboprokatnykh, pryamogo polucheniya metalla, ferrosplavnykh i truboliteynykh tsekhov predpriyatiy chernoy metallurgii,* "Metallurgiya," Moscow, 1970. (Covers specialized equipment for blast furnaces, steelmaking, metal rolling, pipe rolling, direct metal extraction, ferroalloy, and pipe casting shops of ferrous metallurgy enterprises.)	118-121
50.	*Tsennik Number 50 dlya pereotsenki spetsializirovannogo oborudovaniya khimicheskoy promyshlennosti,* "Khimiya," Moscow, 1970. (Covers specialized equipment for the chemical industry.)	127
53.	*Tsennik Number 53 dlya pereotsenki spetsializirovannogo oborudovaniya sazhevoy promyshlennosti,* "Nedra," Moscow, 1970. (Covers specialized equipment for the carbon black industry.)	128

	Title	Sample Item Number
A. 1 January 1972 *Tsennik* Series (continued)		
54.	*Tsennik Number 54 dlya pereotsenki tekhnologicheskogo oborudovaniya shinnoy promyshlennosti, promyshlennosti rezinotekhnicheskikh i asbestotekhnicheskikh izdeliy i rezinovoy obuvi,* "Nedra," Moscow, 1970. (Covers technological equipment for the tire industry, industrial rubber, and asbestos articles, and rubber footwear industries.)	129-130
61.	*Tsennik Number 61 dlya pereotsenki spetsializirovannogo tekhnologicheskogo, kontrol'no-izmeritel'nogo i ispytatel'nogo oborudovaniya dlya proizvodstva izdeliy elektronnoy tekhniki,* "Sovetskoye Radio," Moscow, 1970. (Covers specialized technological control-measuring and testing equipment for the manufacture of items of electronic equipment.)	236-244
80.	*Tsennik Number 80 dlya pereotsenki spetsializirovannogo oborudovaniya sakharnoy promyshlennosti, "Pishchevaya Promyshlennost',"* Moscow, 1970. (Covers specialized equipment for the sugar industry.)	140-141
94.	*Tsennik Number 94 dlya pereotsenki spetsializirovannogo oborudovaniya poligraficheskoy promyshelennosti,* "Kniga," Moscow, 1970. (Covers specialized equipment for the printing industry.)	142-143
100.	*Tsennik Number 100 dlya pereotsenki podvizhnogo sostava zheleznodorozhnogo transporta.* (Covers rolling stock for railroad transportation.) Note: This *Tsennik* is not available. The prices were taken from the secondary source given in the footnote to Item 168 in appendix B.	168-173
110.	*Tsennik Number 110 dlya pereotsenki avtomobiley, avtobusov, avtopritsepov i motorollerov,* Atomizdat, Moscow, 1970. (Covers motor vehicles, buses, vehicle trailers, and motor scooters.)	183-193, 195-196

	Title	Sample Item Number
B. 1 January 1973 *Tsennik* Series		
6.	*Tsennik Number 6 dlya pereotsenki ventilyatorov obshchego naznacheniya, konditsionerov, stroitel'nykh i dorozhnykh mashin, drobil'no-razmol'nogo oborudovaniya, spetsializirovannogo oborudovaniya po proizvodstvu sbornogo zhelezobetona na 1 yanvarya 1973 g.*, "Mashinostroyeniye," Moscow, 1972. (Covers general-purpose ventilators, conditioners, construction and road machinery, crushing-grinding equipment, and specialized equipment for the production of reinforced concrete sections.)	147, 149, 155, 157-158, 160-167
9.	*Tsennik Number 9 dlya pereotsenki khimicheskogo oborudovaniya obshchego naznacheniya, oborudovaniya khimicheskoy promyshlennosti i spetsializirovannogo oborudovaniya dlya lakokrasochnykh pokrytiy na 1 yanvarya 1973 g.*, "Khimiya," Moscow, 1971. (Covers general-purpose chemical equipment, equipment for the chemical industry, and specialized equipment for varnish-paint coverings.)	131-132
10.	*Tsennik Number 10 dlya pereotsenki pod"emno-transportnogo oborudovaniya gruzopod"emnykh i transportiruyushchikh mashin na 1 yanvarya 1973 g.*, "Transport," Moscow, 1971. (Covers hoist-transport equipment, and goods lifting and trans-porting machines.)	144-146, 148, 153
17.	*Tsennik Number 17 dlya pereotsenki sredstv vychislitel'noy tekhniki na 1 yanvarya 1973 g.*, "Mir," Moscow, 1971. (Covers calculating equipment, including computers.)	93-94
25.	*Tsennik Number 25 dlya pereotsenki opticheskikh priborov i prisposobleniy k nim na 1 yanvarya 1973 g.*, "Nedra," Moscow, 1972. (Covers optical instruments and accessories.)	95-97

	Title	Sample Item Number
B. 1 January 1973 *Tsennik* Series (continued)		
29.	*Tsennik Number 29 dlya pereotsenki sel'skokhozyaystvennykh mashin, traktorov i spetsializirovannogo oborudovaniya po remontu traktorov i sel'skokhozyaystvennykh mashin na 1 yanvarya 1973 g.*, "Kolos," Moscow, 1972. (Covers agricultural machinery, tractors, and specialized equipment for the repair of tractors and agricultural machinery.)	207-225
30.	*Tsennik Number 30 dlya pereotsenki spetsializirovannogo oborudovaniya lesnoy i derevoobrabatyvayushchey promyshlennosti na 1 yanvarya 1973 g.*, "Lesnaya Promyshlennost'," Moscow, 1972. (Covers specialized equipment for the forestry and woodworking industries.)	76-81, 92, 133
33.	*Tsennik Number 33 dlya pereotsenki spetsializirovannogo oborudovaniya khlopkoochistitel'noy, khlopchatobumazhnoy, pervichnoy obrabotki shersti, sherstyanoy, shelkovoy, l'nyanoy, pen'kodzhutovoy otrasley promyshlennosti, promyshlennosti netkanykh materialov na 1 yanvarya 1973 g.*, "Legkaya Industriya," Moscow, 1972. (Covers specialized equipment for the cotton, wool, silk, initial working of wool, cotton cleaning, flax, and hemp-jute industries, and the industries of noncloth materials, technical articles, and initial working of bast fibers.)	136-138
34.	*Tsennik Number 34 dlya pereotsenki spetsializirovannogo oborudovaniya trikotazhnoy, shveynoy i tekstil'no-galantereynoy promyshlennosti na 1 yanvarya 1973 g.*, "Legkaya Industriya," Moscow, 1972. (Covers specialized equipment for the knitted goods, clothing, and textile-haberdashery industries.)	134-135

	Title	Sample Item Number
35.	*Tsennik Number 35 dlya pereotsenki spetsializirovannogo oborudovaniya kozhevennoy, obuvnoy, kozhgalantereynoy, mekhovoy i ovchinno-shubnoy promyshlennosti i promyshlennosti iskusstvennykh kozh i plenochnykh materialov na 1 yanvarya 1973 g.*, "Legkaya Industriya," Moscow, 1972. (Covers specialized equipment for the leather, shoe, haberdashery leather, and sheepskin coat industries, and the industry of artificial leather and membrane materials.)	139
42.	*Tsennik Number 42 dlya pereotsenki avtomobiley, avtobusov vsekh vidov, avtopritsepov, motorollerov, spetsializirovannogo avtogarazhnogo i avtoremontnogo oborudovaniya na 1 yanvarya 1973 g.*, "Transport," Moscow, 1972. (Covers motor vehicles and buses of all types, vehicle trailers, motor scooters, and specialized auto garage and auto repair equipment.)	194
45.	*Tsennik Number 45 dlya pereotsenki spetsializirovannogo oborudovaniya svyazi, radio i televideniya na 1 yanvarya 1973 g.*, "Svyaz'," Moscow, 1972. (Covers specialized equipment for communications, radio, and television.)	101-103, 105-109, 226-234
47.	*Tsennik Number 47 dlya pereotsenki meditsinskogo oborudovaniya i meditsinskikh rentgenovskikh ustanovok*, "Meditsina," Moscow, 1971. (Covers medical equipment and medical X-ray equipment.)	104
48.	*Tsennik Number 48 dlya pereotsenki spetsializirovannogo oborudovaniya gidrometeorologicheskoy sluzhby na 1 yanvarya 1973 g.*, Gidrometeoizdat, Moscow, 1972. (Covers specialized hydrometeorological equipment and instruments.)	98-100

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